

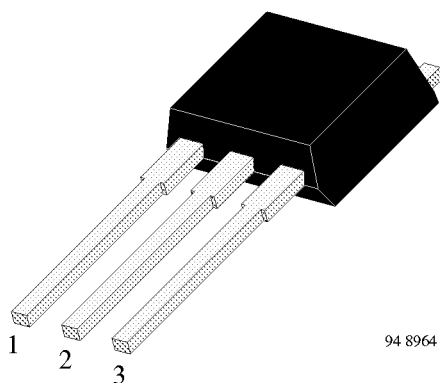
# Silicon NPN High Voltage Switching Transistor

## Features

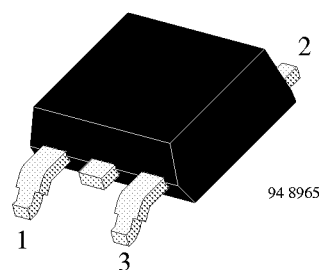
- Simple-sWitch-Off Transistor (SWOT)
- HIGH SPEED technology
- Planar passivation
- 100 kHz switching rate
- Very low switching losses
- Very low dynamic saturation
- Very low operating temperature
- Optimized RBSOA
- High reverse voltage

## Applications

Electronic lamp ballast circuits  
Switch-mode power supplies



BUD636A  
1 Base 2 Collector 3 Emitter



BUD636A –SMD  
1 Base 2 Collector 3 Emitter

## Absolute Maximum Ratings

$T_{case} = 25^{\circ}C$ , unless otherwise specified

| Parameter                 | Test Conditions             | Symbol    | Value       | Unit        |
|---------------------------|-----------------------------|-----------|-------------|-------------|
| Collector-emitter voltage |                             | $V_{CEO}$ | 450         | V           |
|                           |                             | $V_{CEW}$ | 550         | V           |
|                           |                             | $V_{CES}$ | 1000        | V           |
| Emitter-base voltage      |                             | $V_{EBO}$ | 11          | V           |
| Collector current         |                             | $I_C$     | 5           | A           |
| Collector peak current    |                             | $I_{CM}$  | 7.5         | A           |
| Base current              |                             | $I_B$     | 2.5         | A           |
| Base peak current         |                             | $I_{BM}$  | 4           | A           |
| Total power dissipation   | $T_{case} \leq 25^{\circ}C$ | $P_{tot}$ | 40          | W           |
| Junction temperature      |                             | $T_j$     | 150         | $^{\circ}C$ |
| Storage temperature range |                             | $T_{stg}$ | -65 to +150 | $^{\circ}C$ |

### Maximum Thermal Resistance

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

| Parameter     | Test Conditions | Symbol     | Value | Unit |
|---------------|-----------------|------------|-------|------|
| Junction case |                 | $R_{thJC}$ | 3.12  | K/W  |

### Electrical Characteristics

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

| Parameter                                      | Test Conditions                                                                                                             | Symbol         | Min | Typ | Max | Unit          |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------|-----|-----|-----|---------------|
| Collector cut-off current                      | $V_{CES} = 1000\text{ V}$                                                                                                   | $I_{CES}$      |     |     | 50  | $\mu\text{A}$ |
|                                                | $V_{CES} = 1000\text{ V}; T_{case} = 150^{\circ}\text{C}$                                                                   | $I_{CES}$      |     |     | 0.5 | mA            |
| Collector-emitter breakdown voltage (figure 1) | $I_C = 300\text{ mA}; L = 125\text{ mH}; I_{measure} = 100\text{ mA}$                                                       | $V_{(BR)CEO}$  | 450 |     |     | V             |
| Emitter-base breakdown voltage                 | $I_E = 1\text{ mA}$                                                                                                         | $V_{(BR)EBO}$  | 11  |     |     | V             |
| Collector-emitter saturation voltage           | $I_C = 0.8\text{ A}; I_B = 0.2\text{ A}$                                                                                    | $V_{CEsat}$    |     | 0.1 | 0.2 | V             |
|                                                | $I_C = 2.5\text{ A}; I_B = 0.8\text{ A}$                                                                                    | $V_{CEsat}$    |     | 0.2 | 0.4 | V             |
| Base-emitter saturation voltage                | $I_C = 0.8\text{ A}; I_B = 0.2\text{ A}$                                                                                    | $V_{BEsat}$    |     | 0.9 | 1   | V             |
|                                                | $I_C = 2.5\text{ A}; I_B = 0.8\text{ A}$                                                                                    | $V_{BEsat}$    |     | 1   | 1.2 | V             |
| DC forward current transfer ratio              | $V_{CE} = 2\text{ V}; I_C = 10\text{ mA}$                                                                                   | $h_{FE}$       | 15  | 22  |     |               |
|                                                | $V_{CE} = 2\text{ V}; I_C = 0.8\text{ A}$                                                                                   | $h_{FE}$       | 15  | 21  |     |               |
|                                                | $V_{CE} = 2\text{ V}; I_C = 2.5\text{ A}$                                                                                   | $h_{FE}$       | 7   | 10  |     |               |
|                                                | $V_{CE} = 5\text{ V}; I_C = 5\text{ A}$                                                                                     | $h_{FE}$       | 4   | 6   |     |               |
| Collector-emitter working voltage              | $V_S = 50\text{ V}; L = 1\text{ mH}; I_C = 5\text{ A}; I_{B1} = 1.7\text{ A}; -I_{B2} = 0.5\text{ A}; -V_{BB} = 5\text{ V}$ | $V_{CEW}$      | 550 |     |     | V             |
| Dynamic saturation voltage                     | $I_C = 2.5\text{ A}; I_B = 0.5\text{ A}; t = 1\text{ }\mu\text{s}$                                                          | $V_{CEsatdyn}$ |     | 10  | 15  | V             |
|                                                | $I_C = 2.5\text{ A}; I_B = 0.5\text{ A}; t = 3\text{ }\mu\text{s}$                                                          | $V_{CEsatdyn}$ |     | 2.8 | 5   | V             |
| Gain bandwidth product                         | $I_C = 200\text{ mA}; V_{CE} = 10\text{ V}; f = 1\text{ MHz}$                                                               | $f_T$          | 4   |     |     | MHz           |

### Switching Characteristics

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

| Parameter                 | Test Conditions                                                                                                           | Symbol   | Min | Typ  | Max  | Unit          |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------|----------|-----|------|------|---------------|
| Resistive load (figure 2) |                                                                                                                           |          |     |      |      |               |
| Turn on time              | $I_C = 0.8\text{ A}; I_{B1} = 0.2\text{ A}; -I_{B2} = 0.4\text{ A}; V_S = 250\text{ V}$                                   | $t_{on}$ |     | 0.15 | 0.25 | $\mu\text{s}$ |
| Storage time              |                                                                                                                           | $t_s$    |     | 3    | 3.5  | $\mu\text{s}$ |
| Fall time                 |                                                                                                                           | $t_f$    |     | 0.3  | 0.45 | $\mu\text{s}$ |
| Turn on time              | $I_C = 2.5\text{ A}; I_{B1} = 0.5\text{ A}; -I_{B2} = 1.3\text{ A}; V_S = 250\text{ V}$                                   | $t_{on}$ |     | 0.4  | 0.6  | $\mu\text{s}$ |
| Storage time              |                                                                                                                           | $t_s$    |     | 1.3  | 1.5  | $\mu\text{s}$ |
| Fall time                 |                                                                                                                           | $t_f$    |     | 0.1  | 0.15 | $\mu\text{s}$ |
| Inductive load (figure 3) |                                                                                                                           |          |     |      |      |               |
| Storage time              | $I_C = 0.8\text{ A}; I_{B1} = 0.2\text{ A}; -I_{B2} = 0.4\text{ A}; V_{clamp} = 300\text{ V}; L = 200\text{ }\mu\text{H}$ | $t_s$    |     | 3    | 3.5  | $\mu\text{s}$ |
| Fall time                 |                                                                                                                           | $t_f$    |     | 0.2  | 0.3  | $\mu\text{s}$ |
| Storage time              | $I_C = 2.5\text{ A}; I_{B1} = 0.5\text{ A}; -I_{B2} = 1.3\text{ A}; V_{clamp} = 300\text{ V}; L = 200\text{ }\mu\text{H}$ | $t_s$    |     | 1.4  | 1.7  | $\mu\text{s}$ |
| Fall time                 |                                                                                                                           | $t_f$    |     | 0.1  | 0.15 | $\mu\text{s}$ |

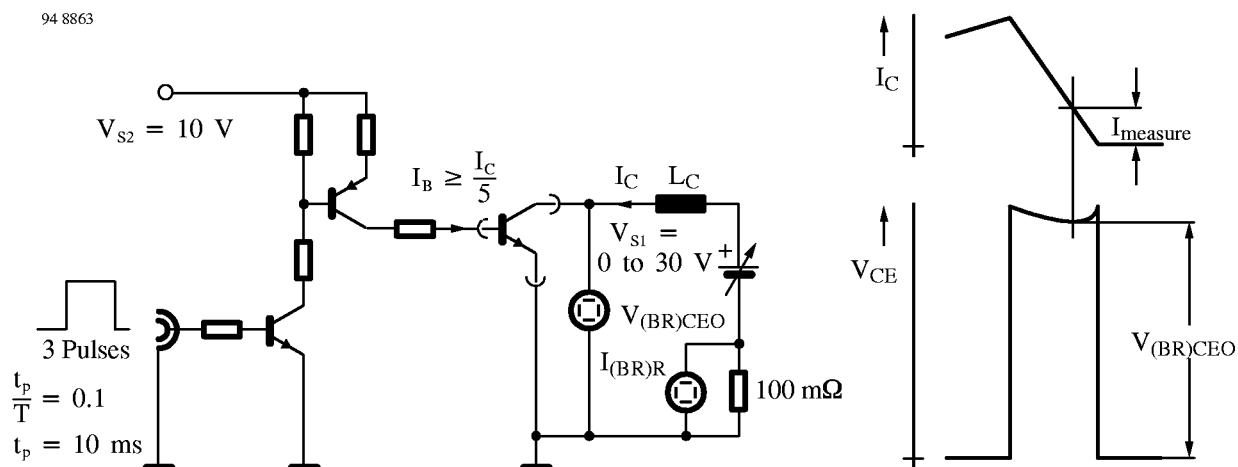
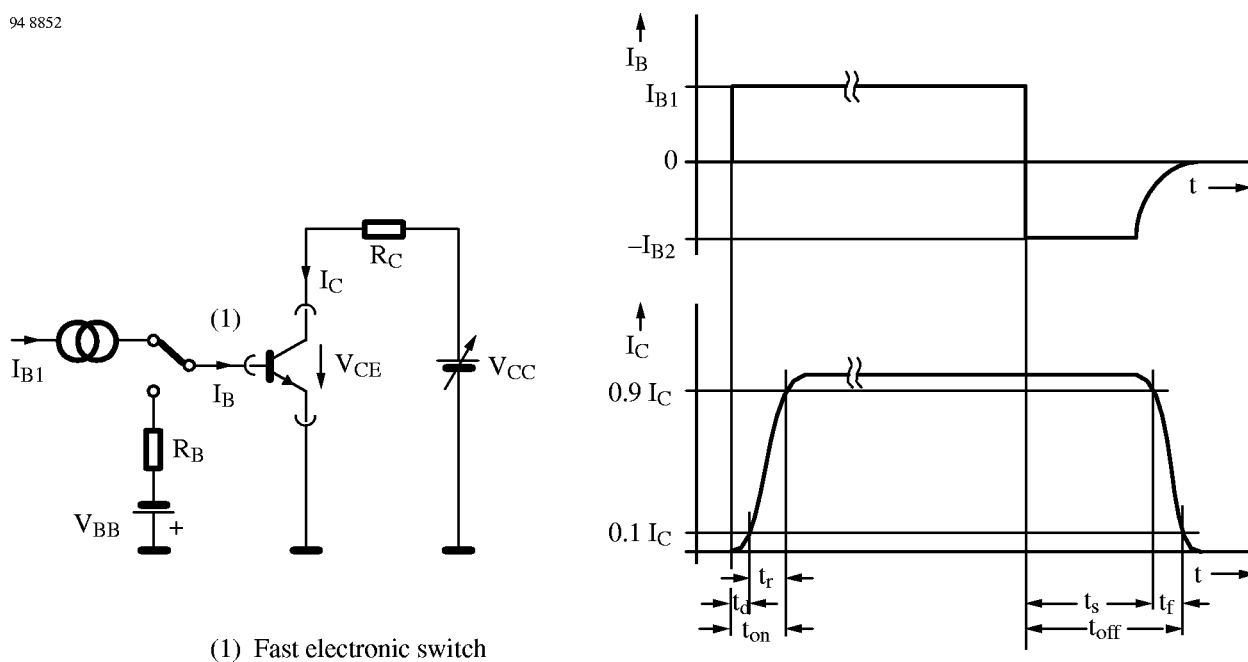

Figure 1. Test circuit for  $V_{(BR)CEO}$ 


Figure 2. Test circuit for switching characteristics – resistive load

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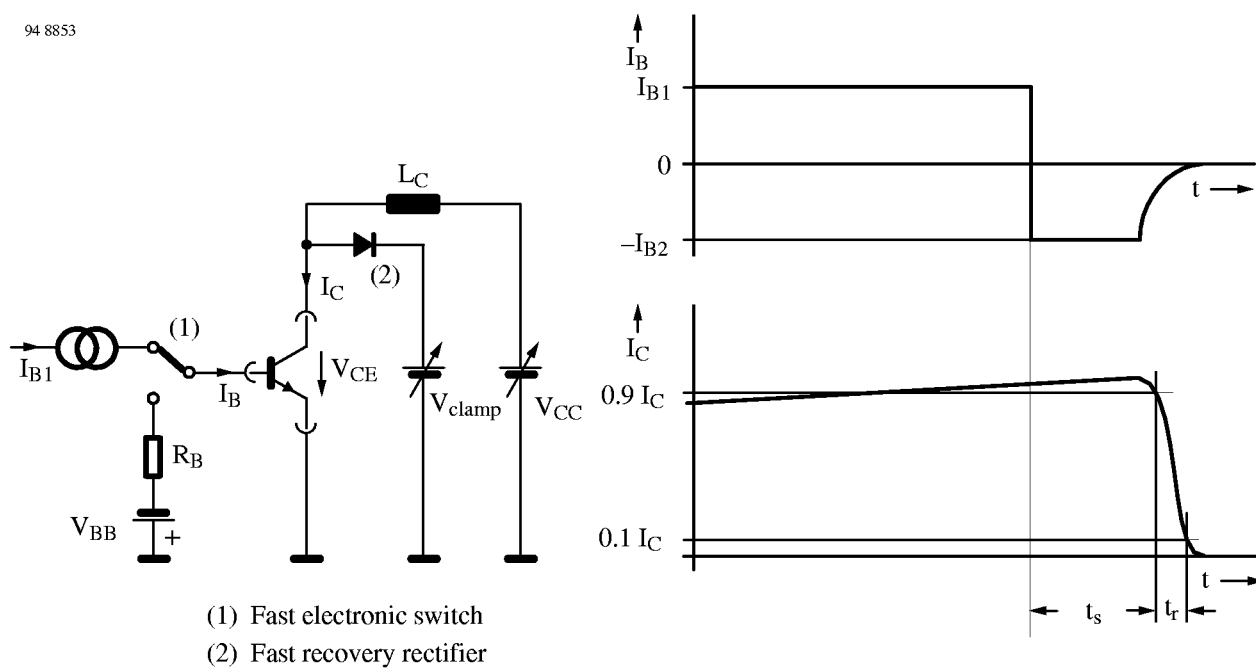


Figure 3. Test circuit for switching characteristics – inductive load

**Typical Characteristics** ( $T_{\text{case}} = 25^\circ\text{C}$  unless otherwise specified)

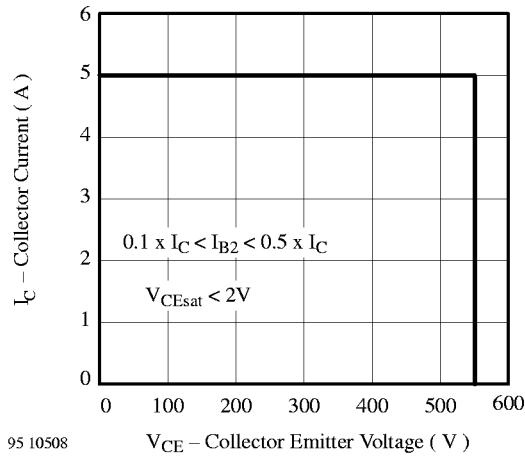


Figure 4.  $V_{\text{CEW}}$  - Diagram

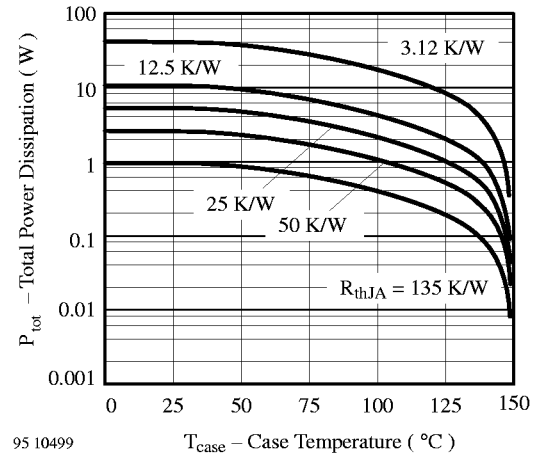


Figure 7.  $P_{\text{tot}}$  vs.  $T_{\text{case}}$

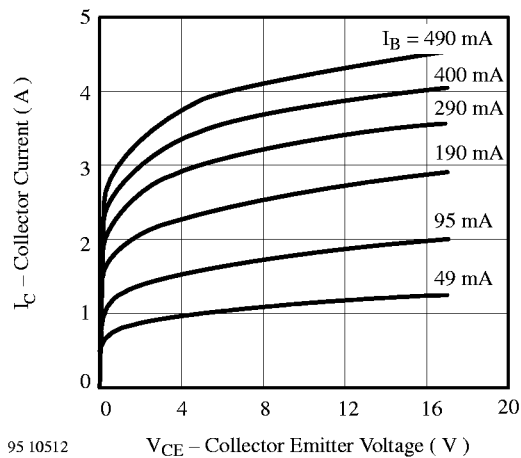


Figure 5.  $I_C$  vs.  $V_{\text{CE}}$

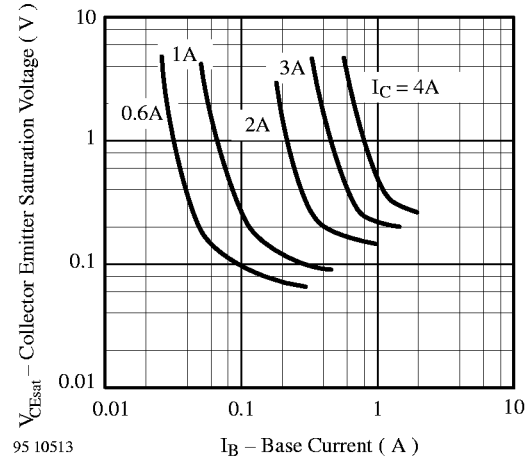


Figure 8.  $V_{\text{CEsat}}$  vs.  $I_B$

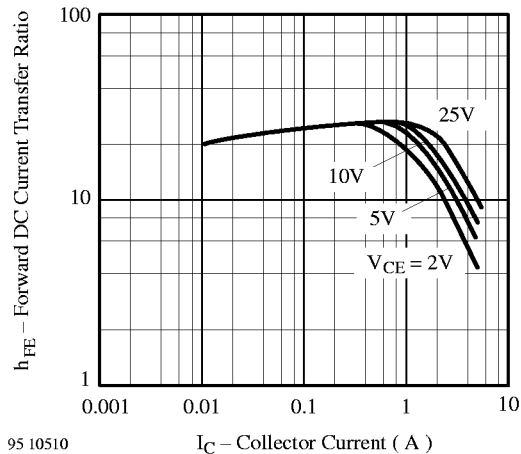


Figure 6.  $h_{\text{FE}}$  vs.  $I_C$

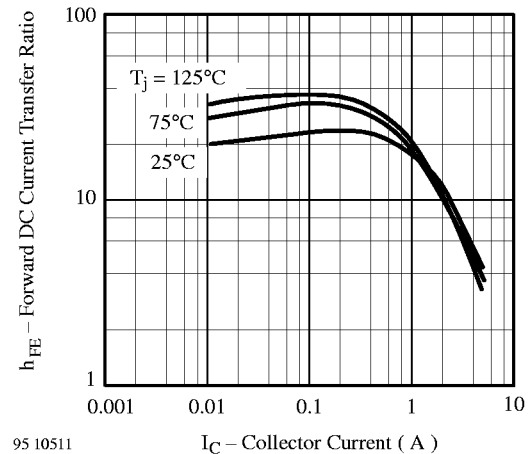


Figure 9.  $h_{\text{FE}}$  vs.  $I_C$

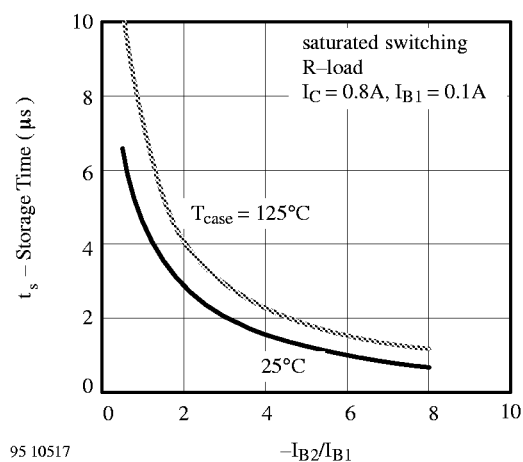


Figure 10.  $t_s$  vs.  $-I_{B2}/I_{B1}$

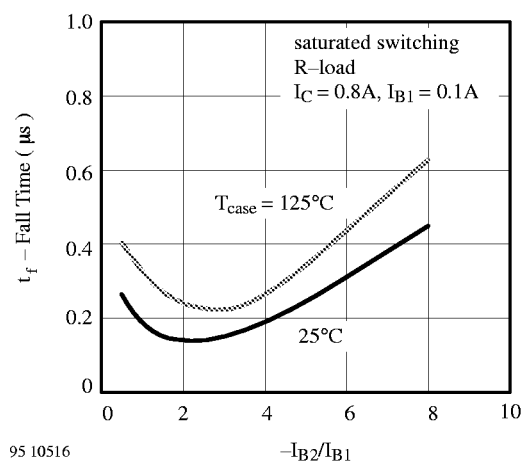


Figure 12.  $t_f$  vs.  $-I_{B2}/I_{B1}$

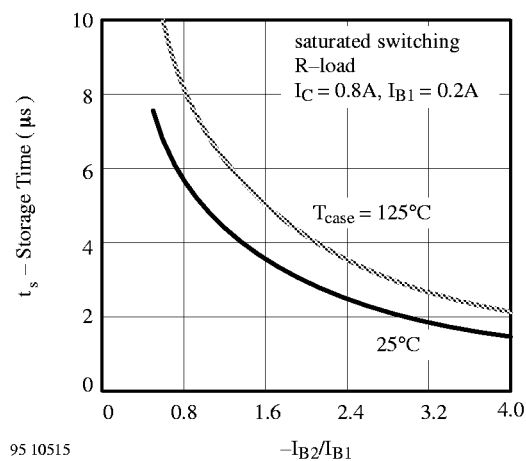


Figure 11.  $t_s$  vs.  $-I_{B2}/I_{B1}$

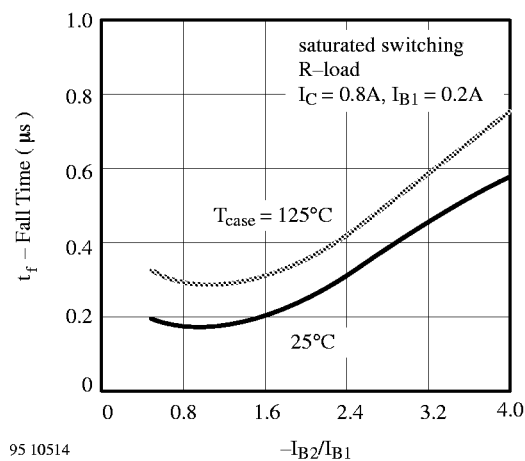
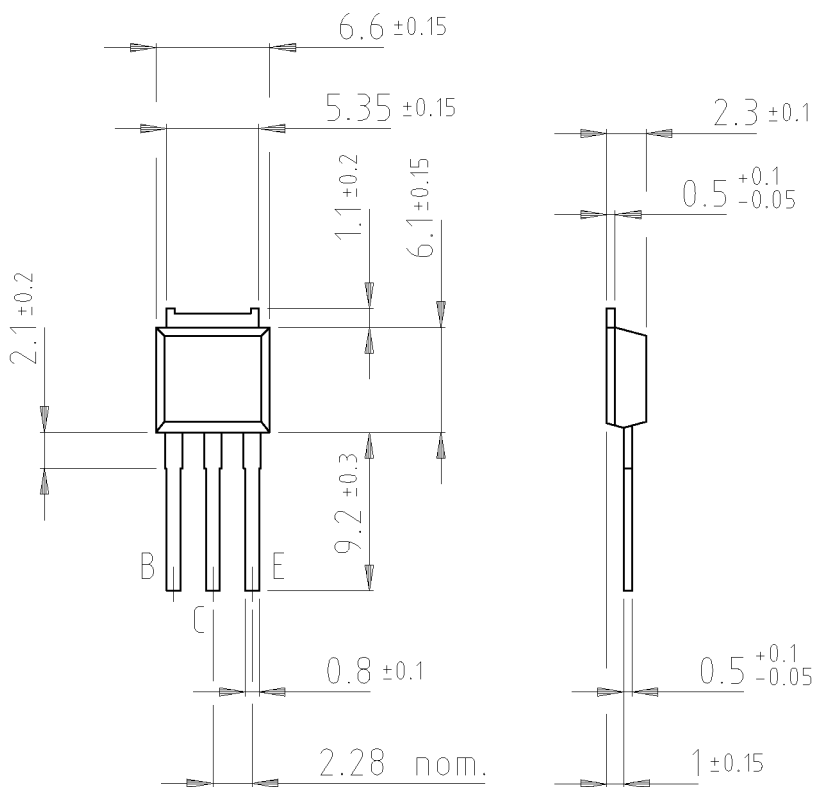
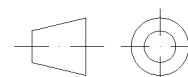


Figure 13.  $t_f$  vs.  $-I_{B2}/I_{B1}$

## Dimensions in mm

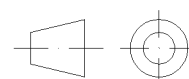
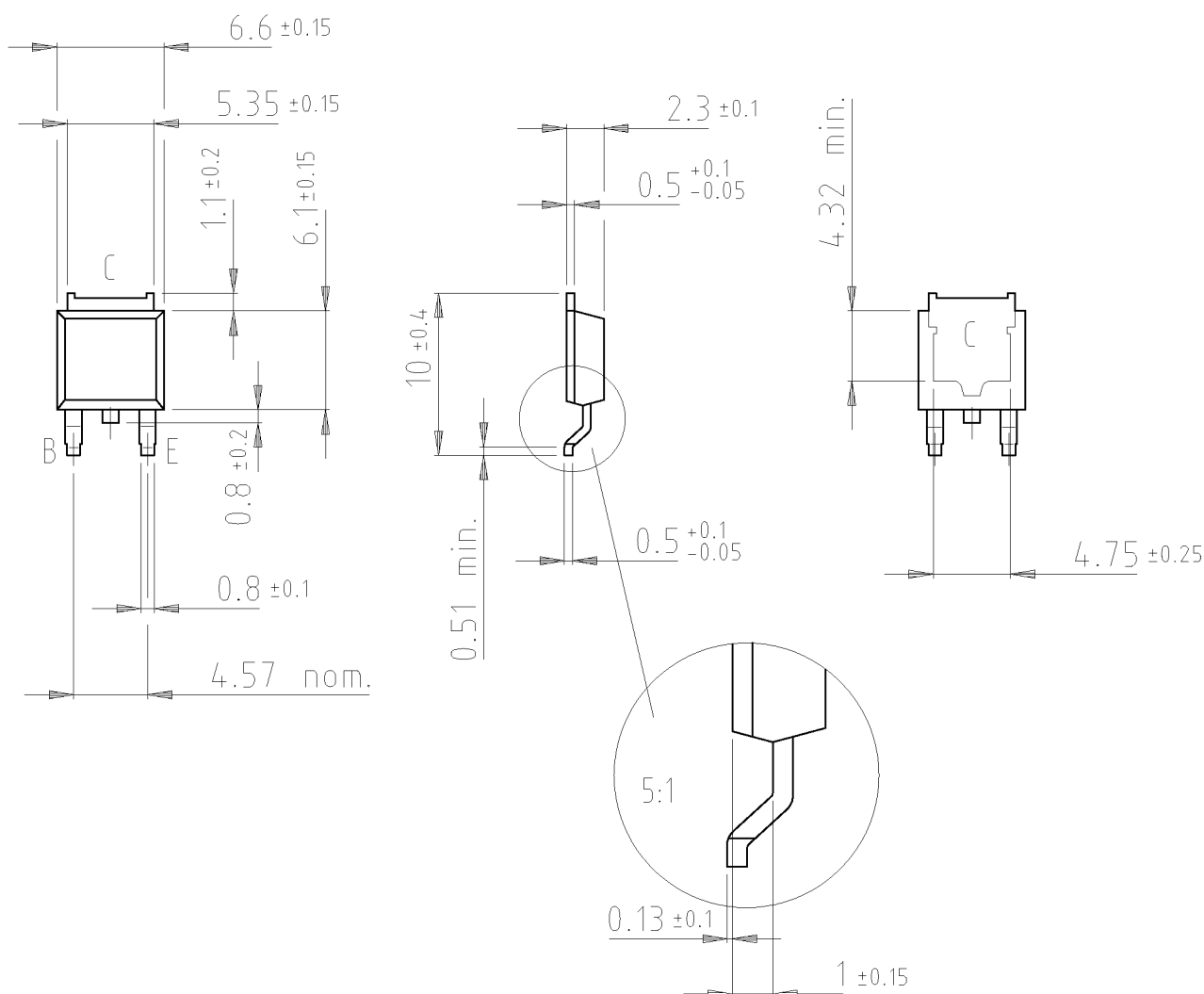


Plastic case JEDEC TO 251  
Collector connected with metallic surface



technical drawings  
according to DIN  
specifications

14292



technical drawings  
according to DIN  
specifications

14293

Plastic case JEDEC TO 252  
Collector connected with metallic surface

For ordering TO 252 add SMD to the type number (i.e. BUD636A –SMD)