

## NPN Silicon Darlington Power Transistor

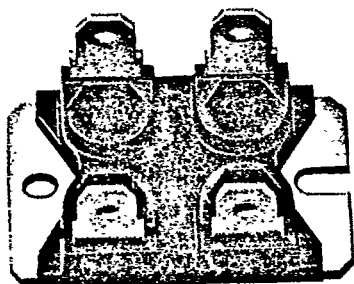
T-33-35

- Applications:
- Motor-control (380 V-mains)
  - UPS (Uninterruptible power supplies)
  - High power SMPS ( $\geq 1000$  W)
  - Battery chargers
  - Welding equipments
  - Inductive heating equipment

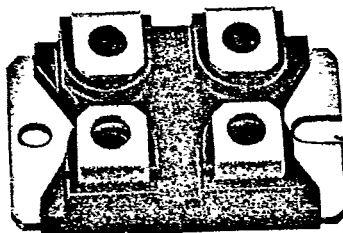
## Features:

- High reverse voltage
- Short switching times
- Very fast C-E-free-wheel diode
- Base 1 and base 2 connectable
- Triple diffusion technique
- Glass passivation

## Case variations

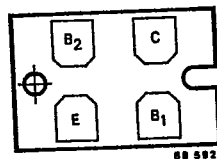
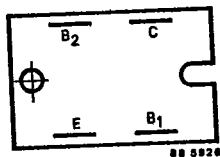
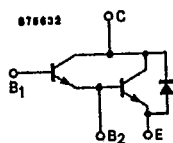


TFK 5070 D



TFK 5070 DA

## Terminal connections

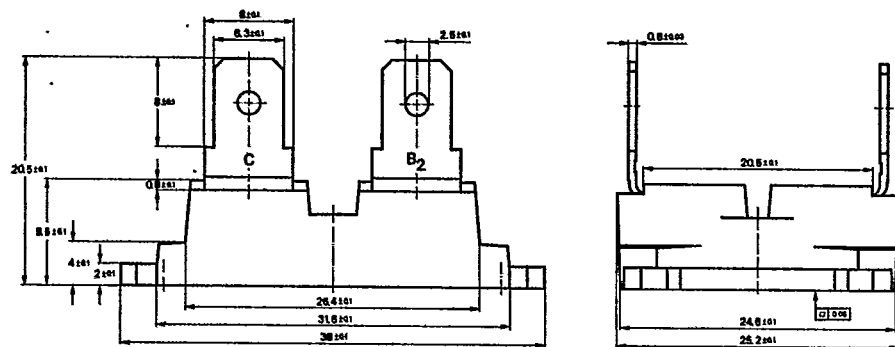


T1.2/1453.0888 E

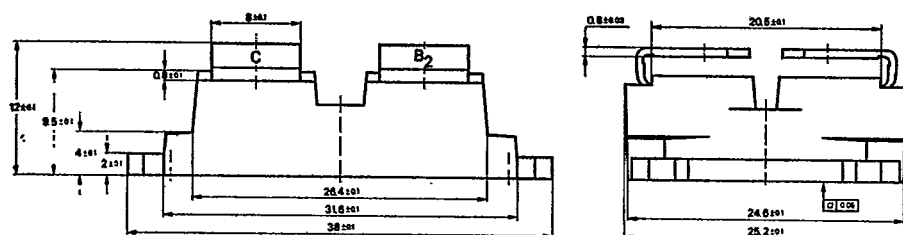
## TFK 5070 D

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Dimensions in mm



TFK 5070 D



TFK 5070 DA

Plastic case

Weight max. 30.0 g

282 2803

D-12

## TFK 5070 D

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## Absolute maximum ratings

|                               |           |            |                  |
|-------------------------------|-----------|------------|------------------|
| Collector-emitter voltage     | $V_{CEO}$ | 700        | V                |
|                               | $V_{CES}$ | 1000       | V                |
| Emitter-base voltage          | $V_{EBO}$ | 7          | V                |
| Collector current             | $I_C$     | 30         | A                |
| Collector peak current        | $I_{CM}$  | 50         | A                |
| Base current                  | $I_B$     | 4          | A                |
| Base peak current             | $I_{BM}$  | 8          | A                |
| Total power dissipation       | $P_{tot}$ | 150        | W                |
| $T_{case} = 25^\circ\text{C}$ |           | 150        | $^\circ\text{C}$ |
| Junction temperature          | $T_J$     | -40...+150 | $^\circ\text{C}$ |
| Storage temperature range     | $T_{stg}$ |            | V                |
| Insulation voltage            | $V_{is}$  | 2500       | V                |

## Maximum thermal resistances

|                  |            |      |     |
|------------------|------------|------|-----|
| Junction case    |            | 0.83 | K/W |
| Power transistor | $R_{thJC}$ | 1.8  | K/W |
| Free-wheel diode | $R_{thJC}$ |      |     |

## Characteristics

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

## Collector cut-off current

 $V_{CE} = 1000\text{ V}, R_1 = 270\ \Omega, R_2 = 100\ \Omega$  $V_{CE} = 1000\text{ V}, R_1 = 27\ \Omega, R_2 = 10\ \Omega$  $T_{case} = 100^\circ\text{C}$  $V_{CE} = 1000\text{ V}, R_1 = 270\ \Omega, R_2 = 100\ \Omega$  $V_{CE} = 1000\text{ V}, R_1 = 27\ \Omega, R_2 = 10\ \Omega$ 

## Emitter cut-off current

 $V_{EB} = 5\text{ V}$  $T_1, T_2$ 

## Collector-emitter breakdown voltage

 $I_C = 750\text{ mA}, L = 125\text{ mH}$  $I_C = 1\text{ mA}, R_1 = 270\ \Omega, R_2 = 100\ \Omega$ 

## Emitter-base breakdown voltage

 $I_E = 5\text{ mA}$  $T_1, T_2$ 

## Collector saturation voltage

 $I_C = 25\text{ A}, I_B = 1.5\text{ A}, T_{case} = 100^\circ\text{C}$  $I_C = 18\text{ A}, I_B = 0.5\text{ A}, T_{case} = 125^\circ\text{C}$ 

## DC forward current transfer ratio

 $V_{CE} = 2\text{ V}, I_C = 25\text{ A}$ 

|               | Min. | Typ. | Max.   |
|---------------|------|------|--------|
| $I_{CER}$     |      |      | 0.4 mA |
| $I_{CER}$     |      |      | 0.6 mA |
| $I_{CER}$     |      |      | 3.0 mA |
| $I_{CER}$     |      |      | 5.0 mA |
| $I_{EBO}$     |      |      | 1.0 mA |
| $V_{(BR)CEO}$ | 700  |      | V      |
| $V_{(BR)CER}$ | 1000 |      | V      |
| $V_{(BR)EBO}$ | 7    |      | V      |
| $V_{CEsat}$   |      |      | 2.5 V  |
| $V_{CEsat}$   |      |      | 2.2 V  |
| $h_{FE}$      | 17   |      |        |

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|  | Min. | Typ. | Max. |
|--|------|------|------|
|--|------|------|------|

Collector-emitter working voltage

-  $I_{CWoff} = 30 \text{ A}$ ,  $I_{B1} = 1.4 \text{ A}$ ,  $L = 12 \mu\text{H}$ -  $V_{BB} = 7 \text{ V}$ ,  $R_{BB} = 0.6 \Omega$ ,  $V_S = 50 \text{ V}$ 

|           |     |  |   |
|-----------|-----|--|---|
| $V_{CEW}$ | 700 |  | V |
|-----------|-----|--|---|

Forward voltage of the diode

 $I_F = 25 \text{ A}$ 

|       |  |     |   |
|-------|--|-----|---|
| $V_F$ |  | 1.9 | V |
|-------|--|-----|---|

## Switching characteristics

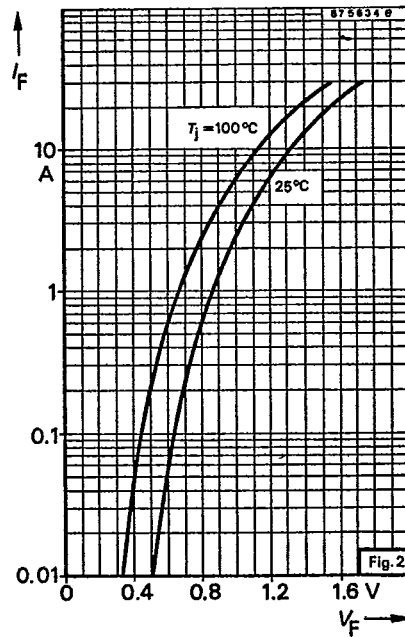
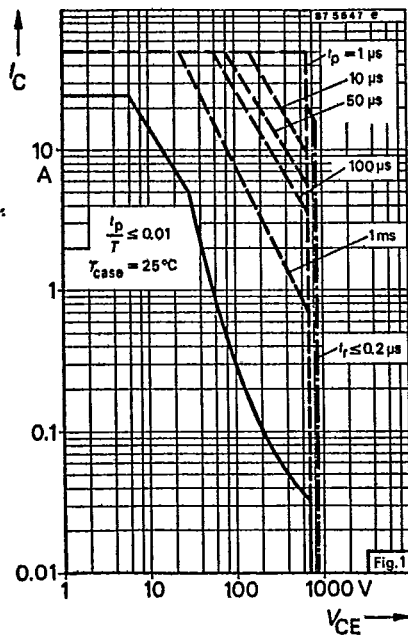
Inductive load,  $T_{case} = 100^\circ\text{C}$  $I_C = 25 \text{ A}$ ,  $I_{B1} = 1.5 \text{ A}$ ,  $L = 0.6 \text{ mH}$ ,  $V_{clamp} = 700 \text{ V}$ -  $V_{BB} = 7 \text{ V}$ ,  $R_{BB} = 0.6 \Omega$ ,  $V_S = 300 \text{ V}$ 

Storage time

|       |  |     |               |
|-------|--|-----|---------------|
| $t_s$ |  | 7.0 | $\mu\text{s}$ |
|-------|--|-----|---------------|

Fall time

|       |  |     |               |
|-------|--|-----|---------------|
| $t_f$ |  | 0.6 | $\mu\text{s}$ |
|-------|--|-----|---------------|



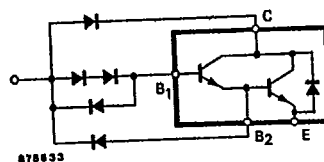
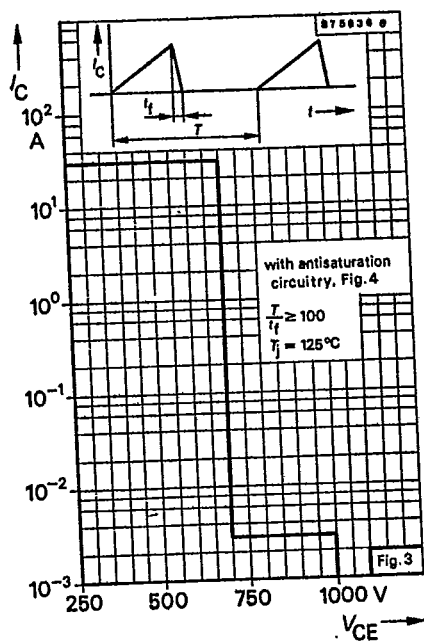
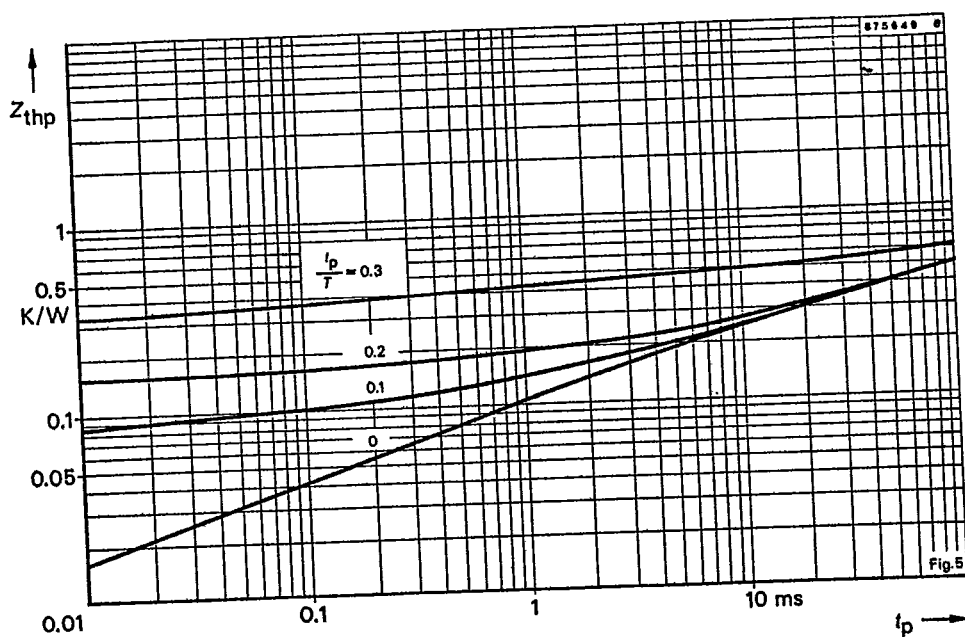


Fig. 4 Antisaturation voltage



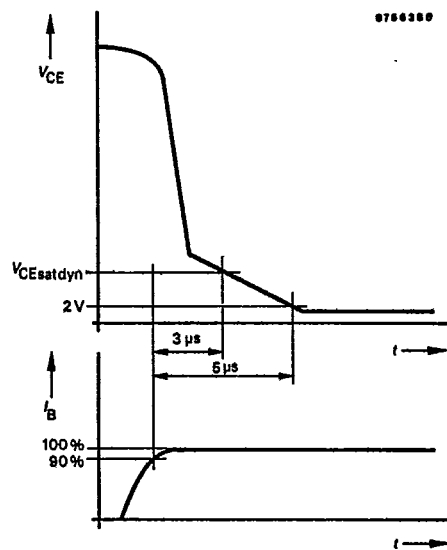
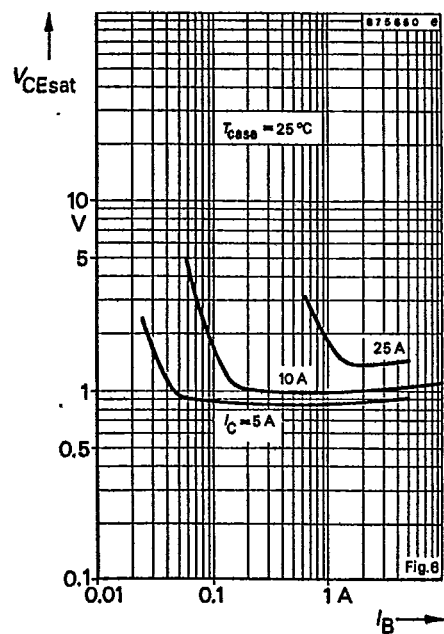
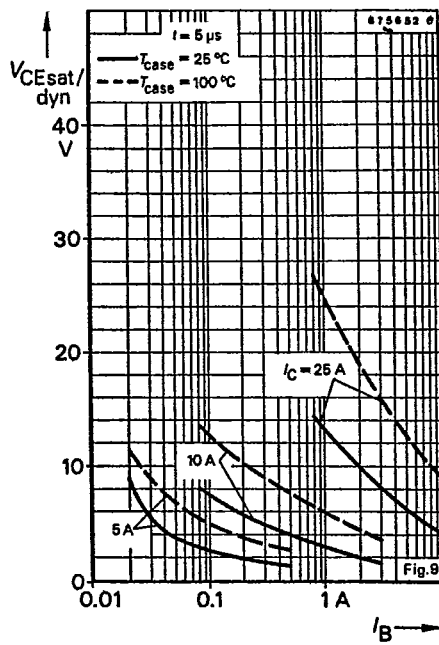
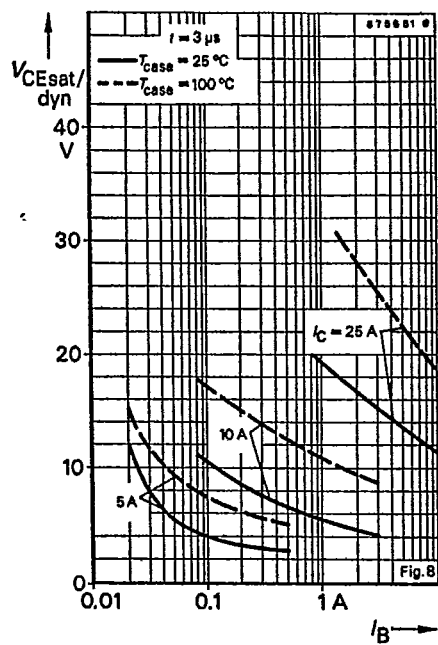
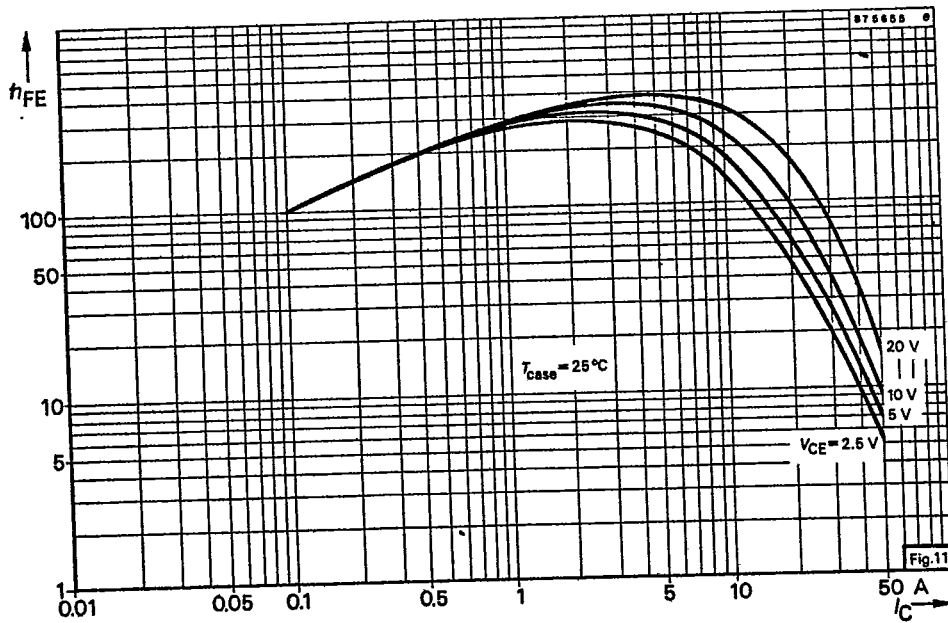
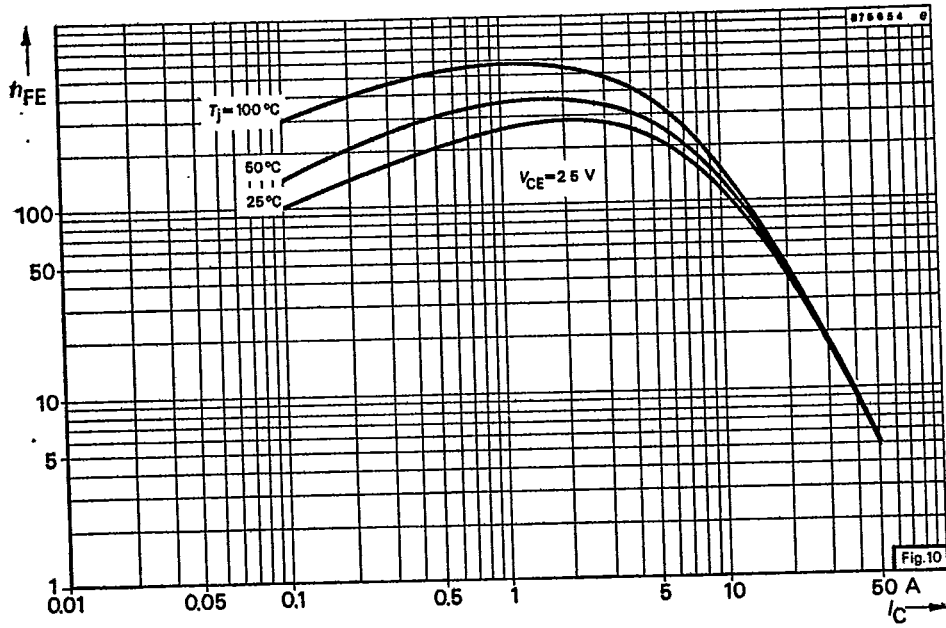


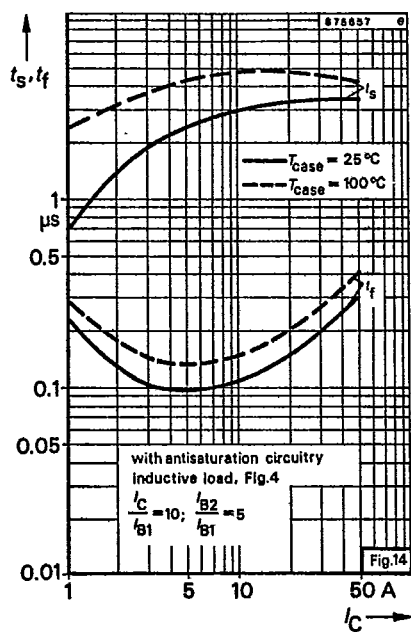
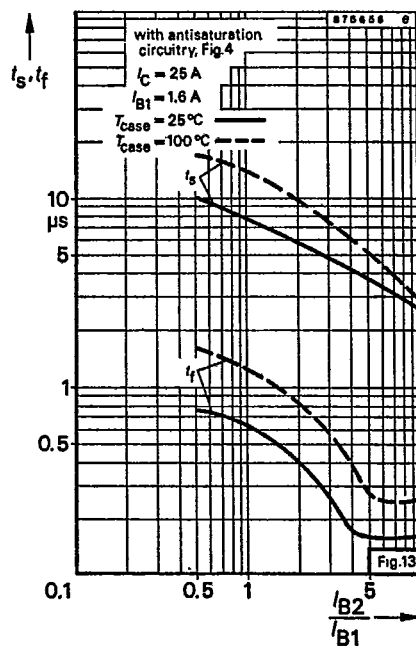
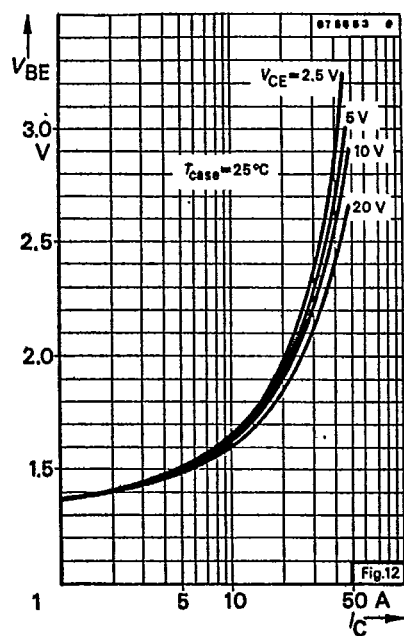
Fig. 7  $V_{CEsatdyn}$ -definition



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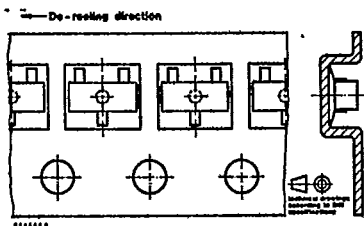
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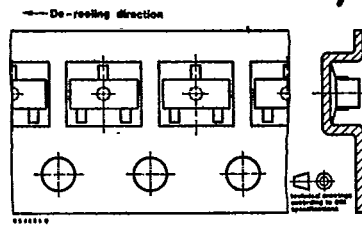




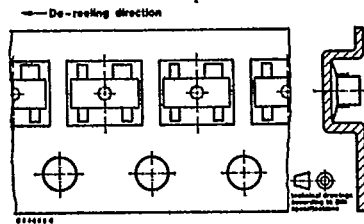




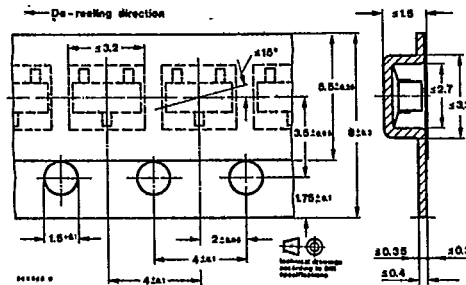
**Fig. 7.4 Standard taped SOT 23**



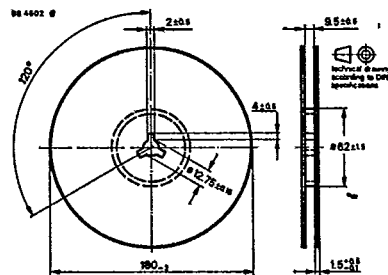
**Fig. 7.6 Reverse taped SOT 23**



**Fig. 7.5 Standard taped SOT 143**



**Fig. 7.7 Dimensions of tape in mm**



**Fig. 7.8 Dimensions of reel in mm**

**b) Reverse taping**

Designation is attached with code GS07 in case of reverse taping. Example for normal version transistors as reverse taped: BF 569 R-GS 07. Example for R-version transistors as reverse taping: BF 569 R-GS 07.

**In case of reverse taping, the transistor orientation on the tape is shown in Fig. 6. Regarding MOF-FET and MES-FET devices, reverse taping is at present not available.**

## 8. Assessories

| Number  | Fig. | Designation                               | For case                                                           |
|---------|------|-------------------------------------------|--------------------------------------------------------------------|
| 119880  | 8.1. | Isolating washer thickness 60 µm          | 12A 3 DIN 41 869<br>JEDEC TO 126 (SOT 32)                          |
| 564542  | 8.2. | Isolating washer thickness 50 µm          | 14A 3 DIN 41 869<br>JEDEC TO 220 (SOT 78)                          |
| 912884  | 8.3  | Isolating washer thickness 50 µm          | 15A 3 DIN 41 869<br>(TOP3) for clip mounting                       |
| 191 131 | 8.4  | Isolating washer thickness 50 µm          | 15A 3 DIN 41 869<br>(TOP3) for screw mounting                      |
| 191 140 | 8.5  | Mounting clip                             | 15A 3 DIN 41 869<br>(TOP3)                                         |
| 569524  | 8.6  | Isolating washer thickness 100 µm + 50 µm | 3B 2 DIN 41 872<br>JEDEC TO 3<br>Devices with high reverse voltage |