

T-33-13

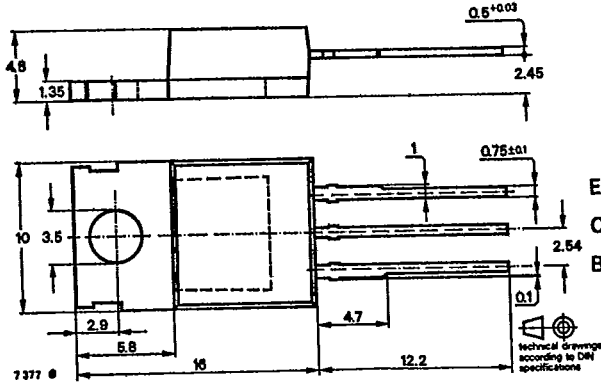
Silicon NPN Power Transistors

Applications: Switching mode power supply

Features:

- In multi diffusion technique
- Glass passivation
- High reverse voltage
- Short switching times
- Power dissipation 100 W

Dimensions in mm



Collector connected with metallic surface

Standard plastic case
14 A 3 DIN 41 869
JEDEC TO 220
Weight max. 2.5 g

Accessories:

Isolating washer No. 564 542

Absolute maximum ratings

	BUT 56	BUT 56 A	
Collector-emitter voltage	V_{CE0} 400	450	V
$R_{BE} \leq 100 \Omega$	V_{CES} 800	1000	V
	V_{CER} 800	1000	V
	Collector peak current	I_{CM} 10	
Collector current	I_C	8	A
Base current	I_{BM}	4	A
	I_{-BM}	4	A
Total power dissipation	P_{tot}	100	W
Junction temperature	T_j	150	°C
	Storage temperature range	T_{stg}	-65 ... +150
Maximum thermal resistance			
Junction case	R_{thJC}	1.25	K/W

T1.2/238.0583 E2

Characteristics		Min.	Typ.	Max.
$T_{case} = 25\text{ }^\circ\text{C}$, unless otherwise specified				
Collector cut-off current				
$V_{CE} = 800\text{ V}$	BUT 56			1 mA
$V_{CE} = 1000\text{ V}$	BUT 56 A			1 mA
$T_J = 150\text{ }^\circ\text{C}$, $V_{CE} = 800\text{ V}$	BUT 56			2 mA
$T_J = 150\text{ }^\circ\text{C}$, $V_{CE} = 1000\text{ V}$	BUT 56 A			2 mA
Collector-emitter breakdown voltage				
$I_C = 100\text{ mA}$, $L_C = 125\text{ mH}$	BUT 56	$V_{(BR)CEO}^{2)}$	400	V
	BUT 56	$V_{(BR)CEO}^{2)}$	450	V
$I_C = 0.5\text{ mA}$, $R_{BE} \leq 100\ \Omega$	BUT 56	$V_{(BR)CER}$	800	V
	BUT 56 A	$V_{(BR)CER}$	1000	V
Emitter-base breakdown voltage				
$I_E = 1\text{ mA}$		$V_{(BR)EBO}$	6	V
Base saturation voltage				
$I_C = 4\text{ A}$, $I_B = 0.8\text{ A}$		$V_{BEsat}^{2)}$		2 V
DC forward current transfer ratio				
$V_{CE} = 5\text{ V}$, $I_C = 1\text{ A}$		h_{FE}		45
$V_{CE} = 5\text{ V}$, $I_C = 4\text{ A}$	BUT 56	h_{FE}	5.5	
$V_{CE} = 2\text{ V}$, $I_C = 3\text{ A}$	BUT 56 A	h_{FE}	4	
Gain bandwidth product				
$V_{CE} = 10\text{ V}$, $I_C = 500\text{ mA}$, $f = 1\text{ MHz}$		f_T	10	MHz

Switching characteristics

$I_C = 4\text{ A}$, $I_{B1} = -I_{B2} = 1.25\text{ A}$, $t_p = 20\ \mu\text{s}$

Turn-off time t_{off} 4 μs

Fall time $t_f^{1)}$ 1 μs

$I_C = 2.5\text{ A}$, $I_{B1} = 0.5\text{ A}$, $-di_B/dt \approx 0.5\text{ A}/\mu\text{s}$,
 $dV_{CE}/dt = 500\text{ V}/\mu\text{s}$ Fig. 6 t_f 0.25 μs

Instruction for the calculation of storage time and turn-off base current with charging values $Q_{s(BE)}$ for inductive collector load, $I_{CE} = 2.5\text{ A}$ and $-I_{B2}$ limited due to:

$$-I_{B2} = 1.41 \sqrt{Q_{s(BE)} \cdot \left| \frac{di_I}{dt} \right|} - I_{B1}$$

$$t_s \approx \frac{I_{B1} + |I_{B2}|}{\left| \frac{di_B}{dt} \right|}$$

¹⁾ By using retrace at switching-off inductive load

²⁾ $\frac{t_p}{T} \geq 0.01$, $t_p = 0.3\text{ ms}$

BUT 56 · BUT 56 A

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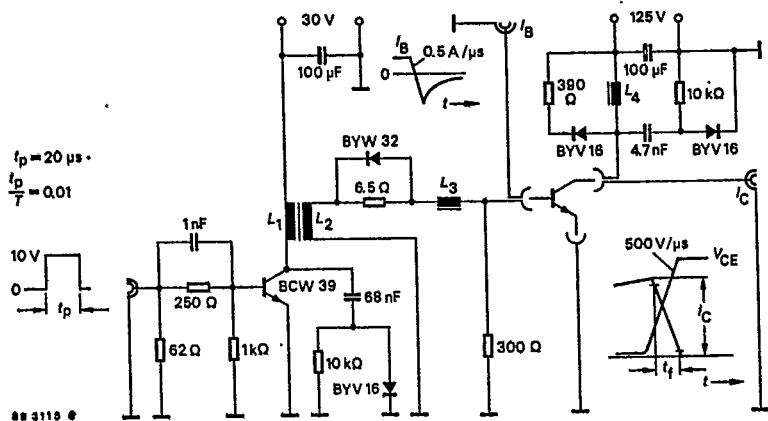
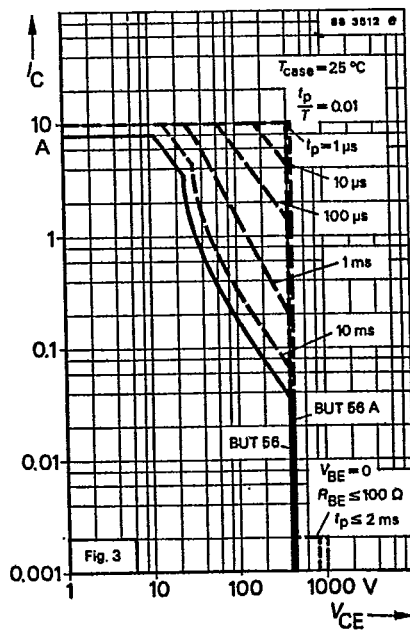
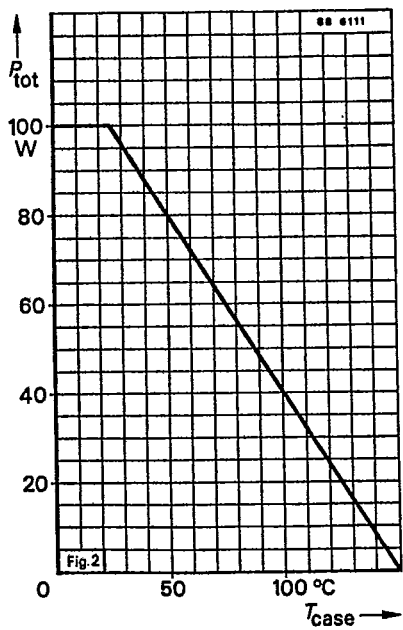
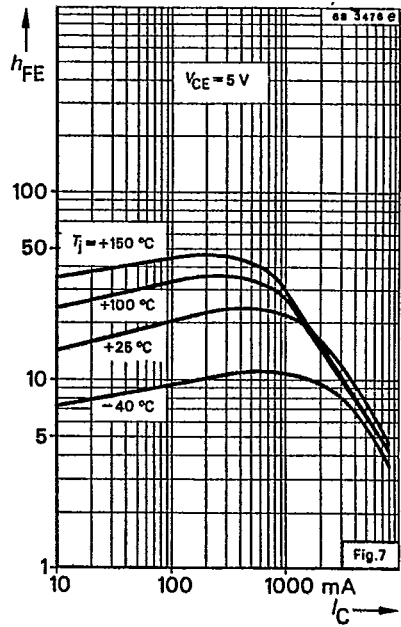
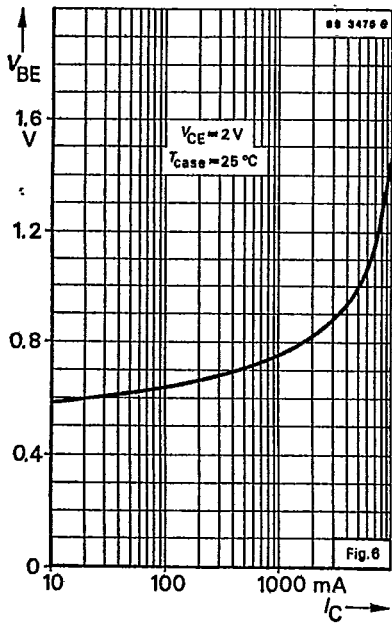
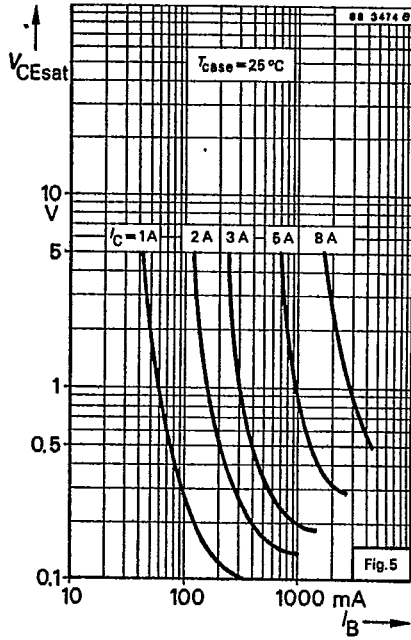
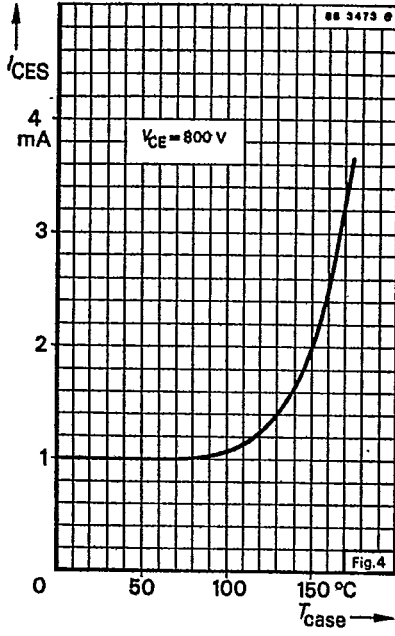


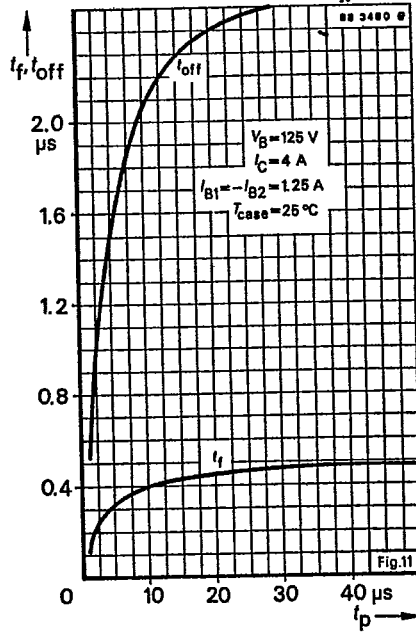
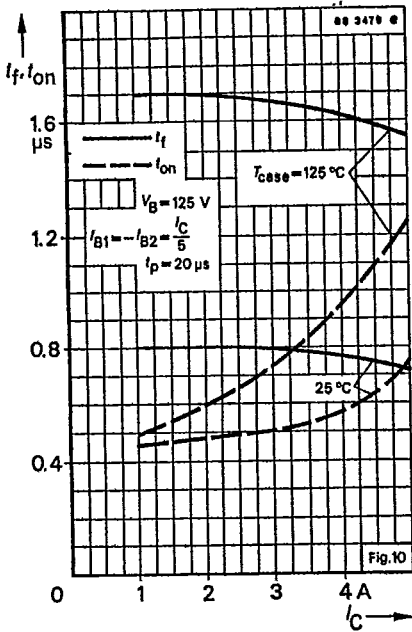
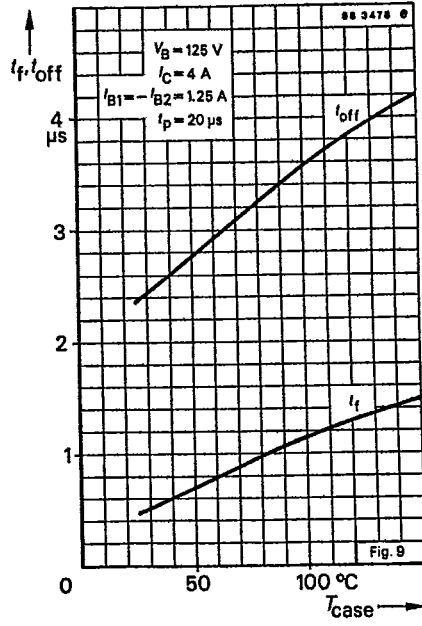
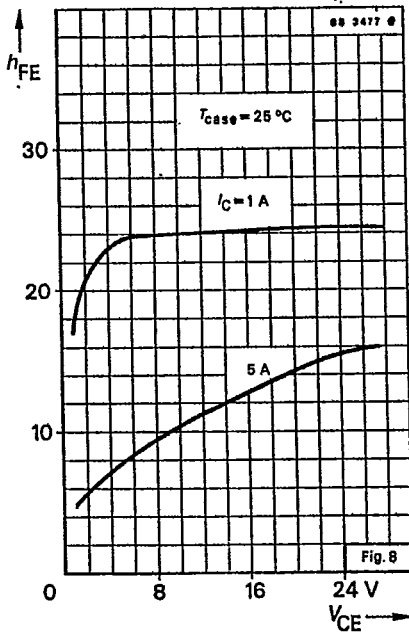
Fig. 1 Test circuit for switching characteristics





BUT 56 · BUT 56 A

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T-91-20

A E G CORP

● Family of curves

Besides the static (d. c.) and dynamic (a. c.) characteristics, family of curves are given for specified operating conditions. They show the typical interdependence of individual characteristics. Partly are given the scattering limits. They signify that at least 95% of the delivery lies inside these tolerances.

6.6. Additional informations

Preliminary specifications

This heading indicates that some information on the device concerned may be subject to slight changes.

Not for new developments

This heading indicates that the device concerned should not be used in equipment under development, it is, however, available for present production.

7. Taping and reeling

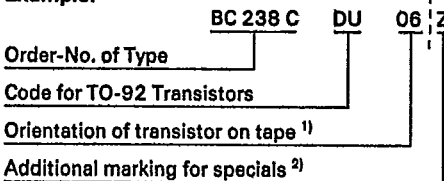
7.1. Taping of TO-92 transistors

Standard reeling: Taped on reel, reeled together with a paper film.

7.1.1. Order Numbers

Add the taping-code to the order number.

Example:



¹⁾ 06 = View on flat side of transistor, view on gummed tape

05 = View on round side of transistor, view on gummed tape

²⁾ Additional marking "O":

Taping without paper film

Additional marking "Z":

Zigzag folded tape in special box. Marking for orientation of transistor not necessary, because box can be opened on top or bottom.

Example for order No.: BC 237 C DU Z

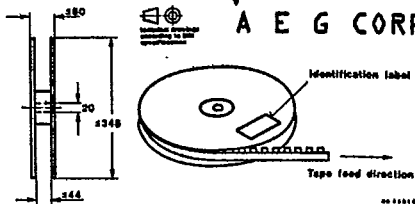


Fig. 7.1. Dimensions of reel in mm

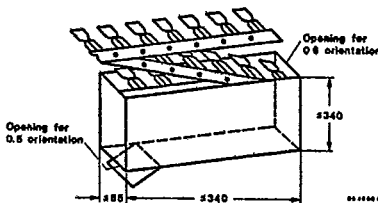


Fig. 7.2. Dimension of box for Zigzag folding in mm

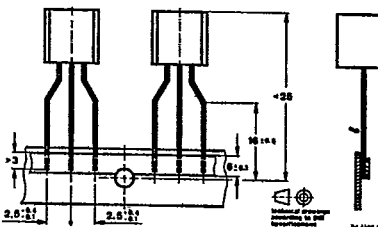


Fig. 7.3. Dimensions of tape in mm

7.1.2 Quantity of devices

1 000 devices per reel

2 000 devices per folded tape in special box.

7.2 Taped transistors in SOT 23 and SOT 143 case

a) Standard taping

Designation is attached with code GS 08 in case of standard taping. Example for normal version transistors as standard taped: BF 569-GS08.

Example for R-version transistors as standard taped: BF 569 R-GS 08.

In case of standard taping, the transistor orientation on the tape is shown in Fig. 7.4 and Fig. 7.5.

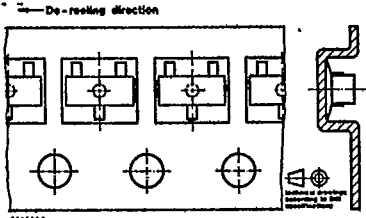


Fig. 7.4 Standard taped SOT 23

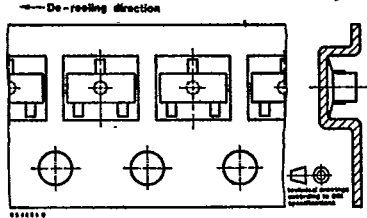


Fig. 7.6 Reverse taped SOT 23

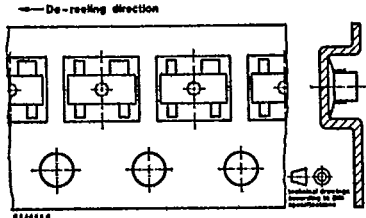


Fig. 7.5 Standard taped SOT 143

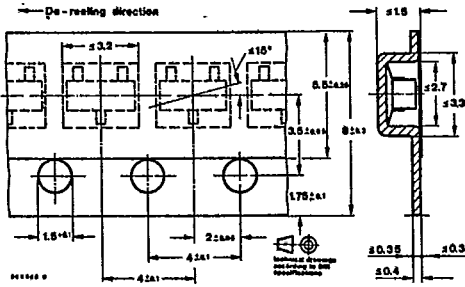


Fig. 7.7 Dimensions of tape in mm

b) Reverse taping
 Designation is attached with code GS 07 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.

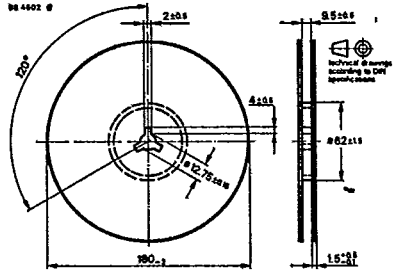


Fig. 7.8 Dimensions of reel in mm

8. Accessories

Number	Fig.	Designation
119 880	8.1.	Isolating washer thickness 60 µm
564 542	8.2.	Isolating washer thickness 50 µm
912 884	8.3	Isolating washer thickness 50 µm
191 131	8.4	Isolating washer thickness 50 µm
191 140	8.5	Mounting clip
569 524	8.6	Isolating washer thickness 100 µm + 50 µm

7.2.2 Quantity of devices
 3000 devices per reel

- For case
- 12A 3 DIN 41 869 JEDEC TO 126 (SOT 32)
 - 14A 3 DIN 41 869 JEDEC TO 220 (SOT 78)
 - 15A 3 DIN 41 869 (TOP3) for clip mounting
 - 15A 3 DIN 41 869 (TOP3) for screw mounting
 - 15A 3 DIN 41 869 (TOP3)
 - 3B 2 DIN 41 872 JEDEC TO 3
- Devices with high reverse voltage