T-31-25

TELEFUNKEN electronic
Creative Technologies

BF 960

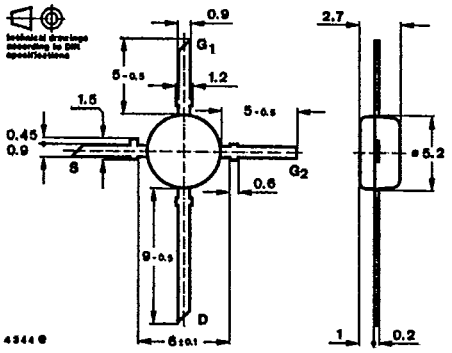
N-Channel Dual Gate MOS-Fieldeffect Tetrode · Depletion Mode

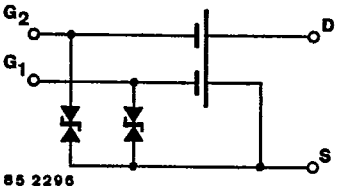
Applications: Input- and Mixerstages especially for UHF TV-tuners up to 900 MHz

Features:

- Integrated Gate protection diodes
- High cross modulation performance
- Low noise figure
- High AGC-range
- Low feedback capacitance
- Low input capacitance

Dimensions in mm





Case
50 B 4 DIN 41 867
JEDEC TO 50
Weight max. 0.1 g

Absolute maximum ratings

Drain Source Voltage	V_{DS}	20	V
Drain current	I_D	30	mA
Gate 1/Gate 2-Source peak current	$\pm I_{G1/2SM}$	10	mA
Total power dissipation $T_{amb} = 60$ °C	P_{tot}	200	mW
Channel temperature	T_C	150	°C
Storage temperature range	T_{stg}	−55 ... +150	°C

Thermal resistance

		Min.	Typ.	Max.	
Channel ambient mounted on pc-board one side Cu 35 µm thickness 40 x 25 x 1.5 mm³	R_{thCA}			450	K/W

T1.2/330.1183 E2

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DC characteristics		Min.	Typ.	Max.	
$T_{amb} = 25$ °C, unless otherwise specified					
Drain-source breakdown voltage $I_D = 10$ µA, $-V_{G1S} = -V_{G2S} = 4$ V	$V_{(BR)DS}$	20			V
Gate 1-Source breakdown voltage $\pm I_{G1S} = 10$ mA, $V_{G2S} = V_{DS} = 0$	$\pm V_{(BR)G1SS}$	6		20	V
Gate 2-Source breakdown voltage $\pm I_{G2S} = 10$ mA, $V_{G1S} = V_{DS} = 0$	$\pm V_{(BR)G2SS}$	6		20	V
Gate 1-Source cutt-off current $\pm V_{G1S} = 5$ V, $V_{G2S} = V_{DS} = 0$	I_{G1SS}			50	nA
Gate 2-Source cut-off curret $\pm V_{G2S} = 5$ V, $V_{G1S} = V_{DS} = 0$	I_{G2SS}			50	nA
Drain current $V_{DS} = 15$ V, $V_{G1S} = 0$, $V_{G2S} = 4$ V	I_{DSS}	2		20	mA
Gate 1-Source cutt-off voltage $V_{DS} = 15$ V, $V_{G2S} = 4$ V, $I_D = 20$ µA	$-V_{G1S(OFF)}$			2.7	V
Gate 2-Source cutt-off voltage $V_{DS} = 15$ V, $V_{G1S} = 0$ V, $I_D = 20$ µA	$-V_{G2S(OFF)}$			2.7	V
AC characteristics					
$V_{DS} = 15$ V, $I_D = 7$ mA, $V_{G2S} = 4$ V, $f = 1$ MHz, $T_{amb} = 25$ °C, unless otherwise specified					
Forward transadmitance	$\|y_{21}\|$	10	13		mS
Gate 1-Input capacitance	C_{iSSg1}		1.8		pF
Gate 2-Input capacitance $V_{G1S} = 0$, $V_{G2S} = 4$ V	C_{iSSg2}		1.0		pF
Feedback capacitance	C_{rSS} [1]		25		fF
Output capacitance	C_{oSS}		0.8		pF
Power gain $V_{DS} = 15$ V, $I_D = 7$ mA, $V_{G2S} = 4$ V, $g_G = 2$ mS, $g_L = 5$ mS, $f = 200$ MHz	G_{ps}		23		dB
$g_L = 1$ mS, $f = 800$ MHz	G_{ps}		16.5		dB
Noise figure $g_G = 2$ mS, $f = 800$ MHz $V_{DS} = 15$ V, $I_D = 7$ mA, $V_{G2S} = 4$ V, $V_{G1S} = 0$	F		2.2	3	dB

[1] G_2 and S grounded

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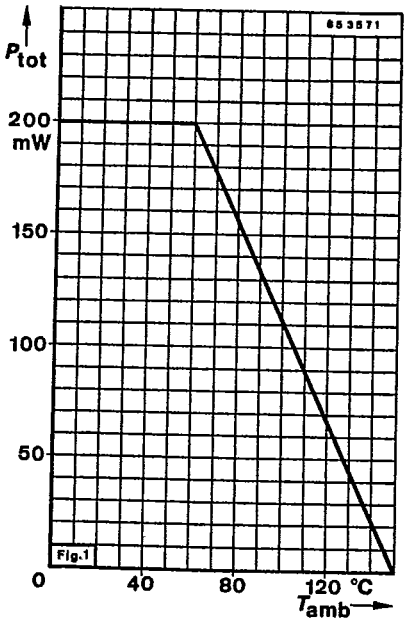

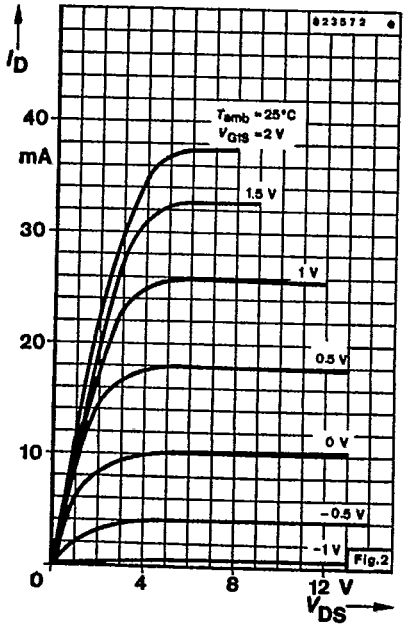

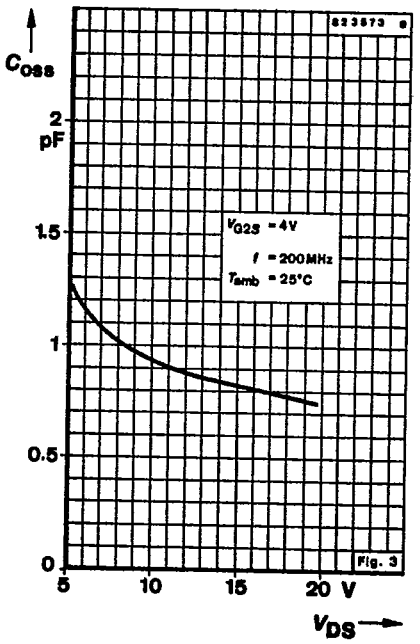

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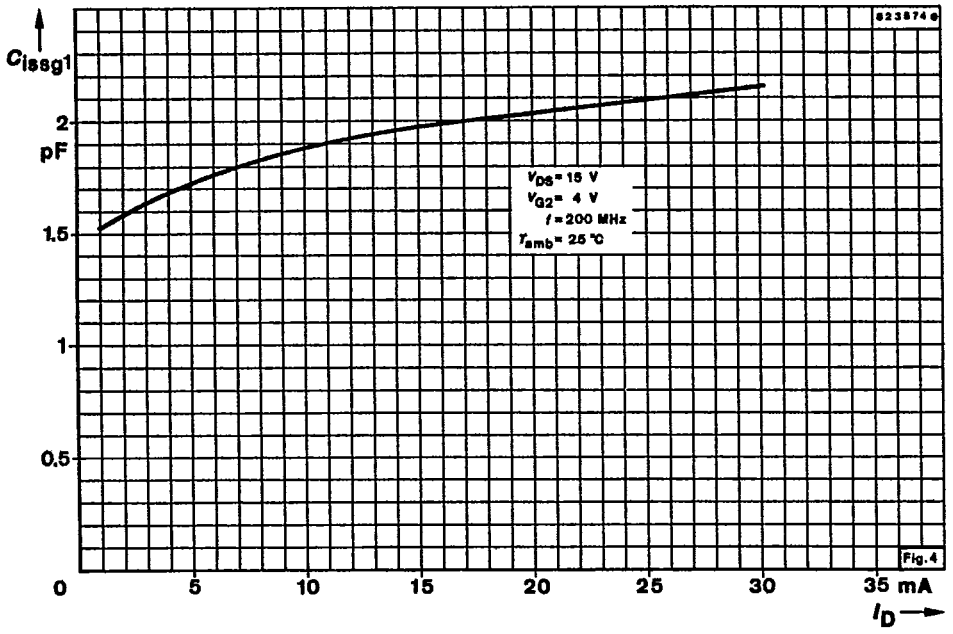
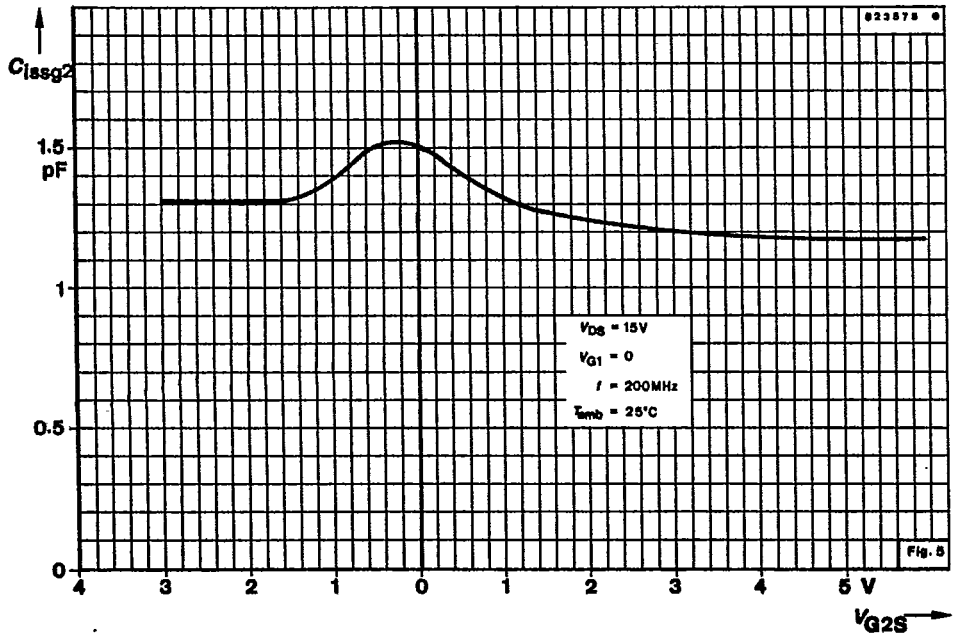

C_{issg1}
2 pF
1.5
1
0.5
0
5
10
15
20
25
30
35 mA
I_D
V_{DS} = 15 V
V_{G2} = 4 V
f = 200 MHz
T_{amb} = 25 °C
Fig. 4


C_{issg2}
1.5 pF
1
0.5
0
4
3
2
1
0
1
2
3
4
5 V
V_{G2S}
V_{DS} = 15V
V_{G1} = 0
f = 200MHz
T_{amb} = 25°C
Fig. 5

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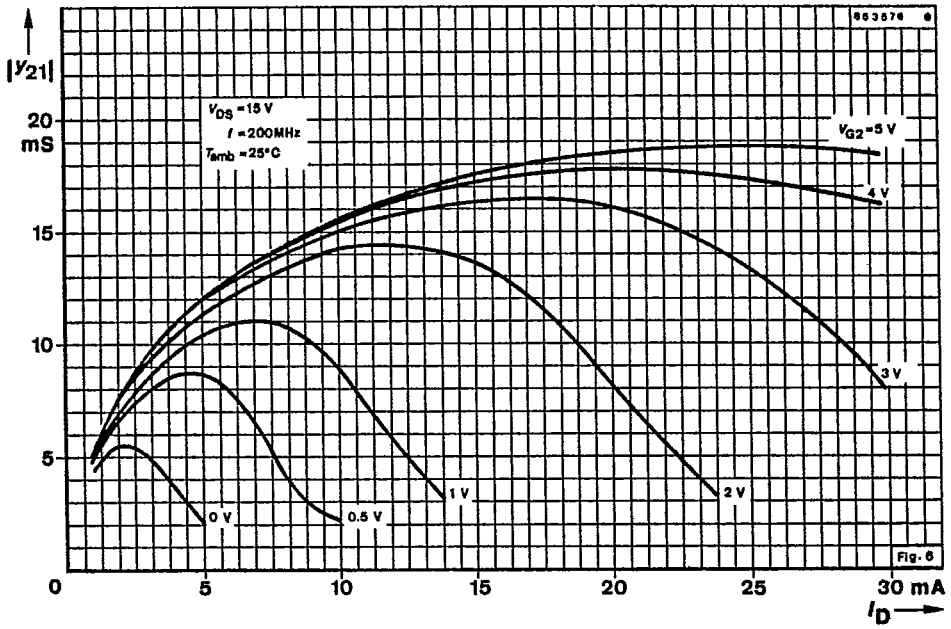
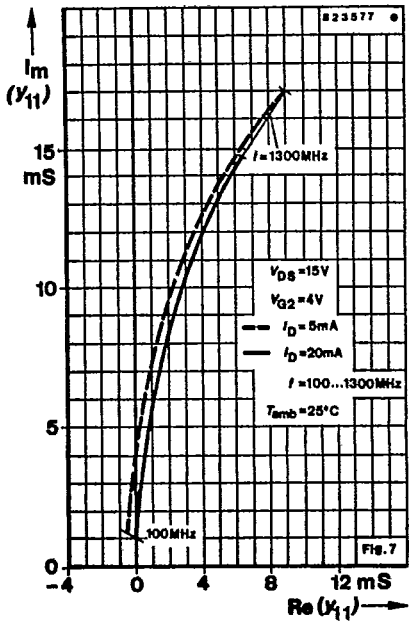
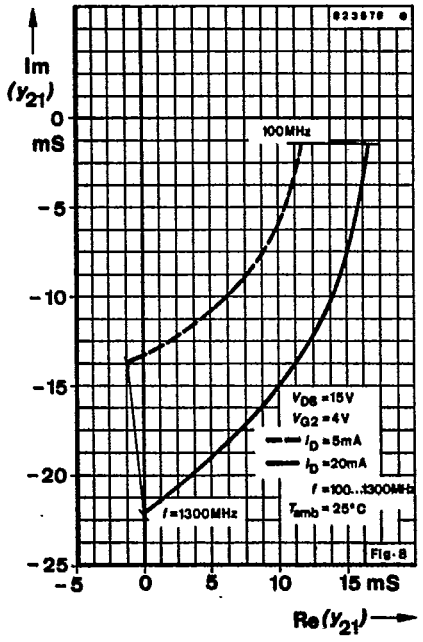

|y21|
20 mS
15
10
5
0
0
5
10
15
20
25
30 mA
ID
VDS=15 V
f=200MHz
Tamb=25°C
VG2=5 V
4 V
3 V
2 V
1 V
0.5 V
0 V
Fig. 6


Im (y11)
15 mS
10
5
0
-4
0
4
8
12 mS
Re (y11)
f=1300MHz
100MHz
VDS=15V
VG2=4V
ID=5mA
ID=20mA
f=100...1300MHz
Tamb=25°C
Fig. 7


Im (y21)
0 mS
-5
-10
-15
-20
-25
-5
0
5
10
15 mS
Re (y21)
100MHz
f=1300MHz
VDS=15V
VG2=4V
ID=5mA
ID=20mA
f=100...1300MHz
Tamb=25°C
Fig. 8

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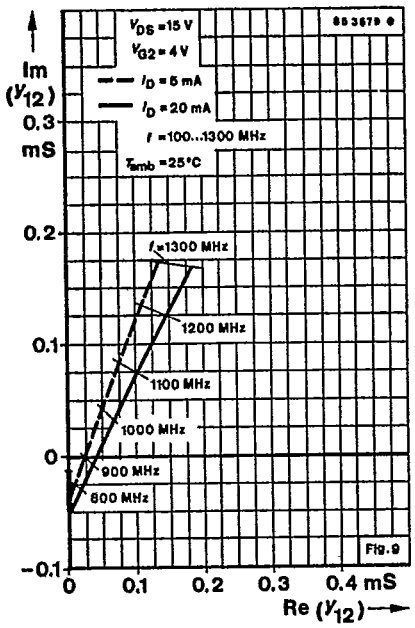

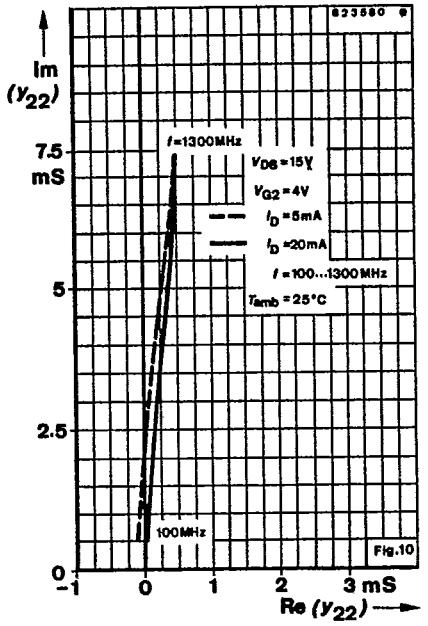

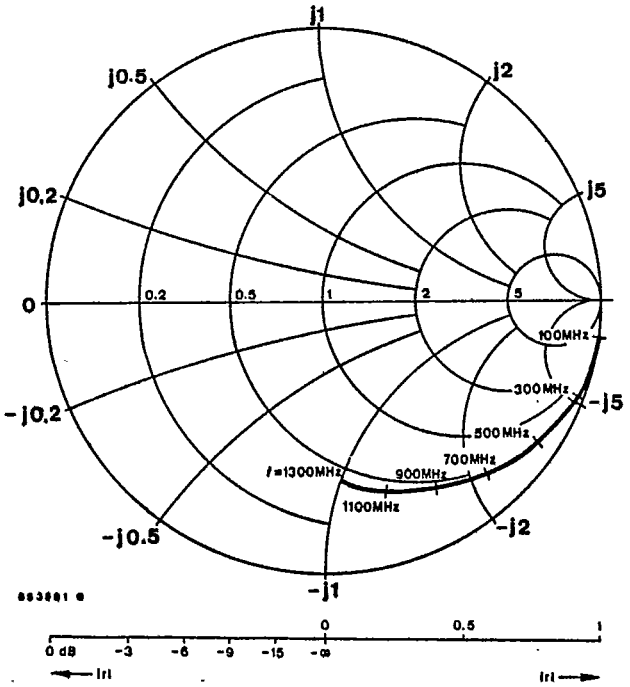

S_{11}
I_D = 10mA
V_{DS} = 15V
V_{G2} = 4V
Z_0 = 50Ω
f = 100...1300MHz
T_{amb} = 25°C

Fig.11

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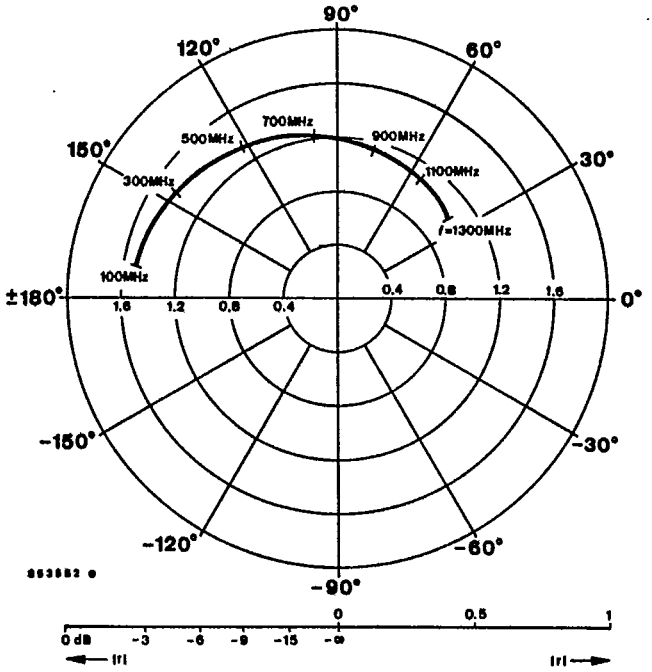
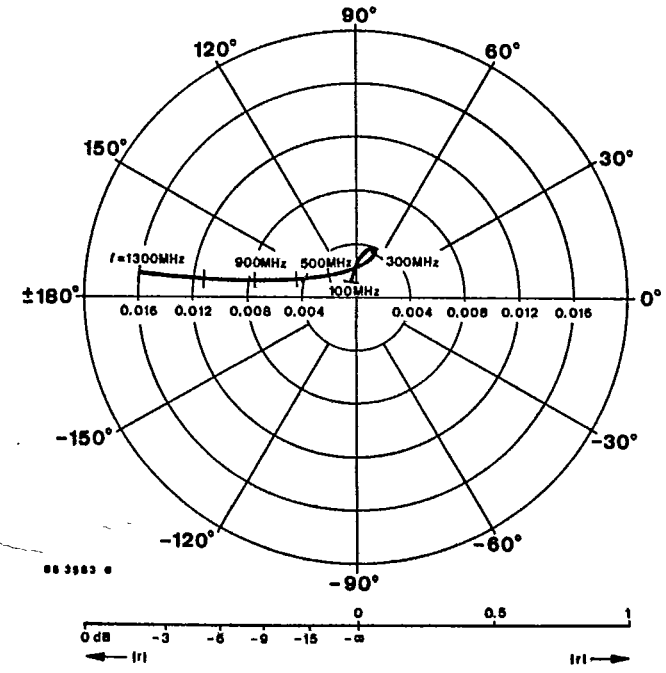


S_{21}

Z_o = 50Ω
V_{DS} = 15V
V_{G2} = 4V
I_D = 10mA
f = 100...1300MHz
T_{amb} = 25°C

Fig.12



S_{12}

Z_o = 50Ω
V_{DS} = 15V
V_{G2} = 4V
I_D = 10mA
f = 100...1300MHz
T_{amb} = 25°C

Fig.13

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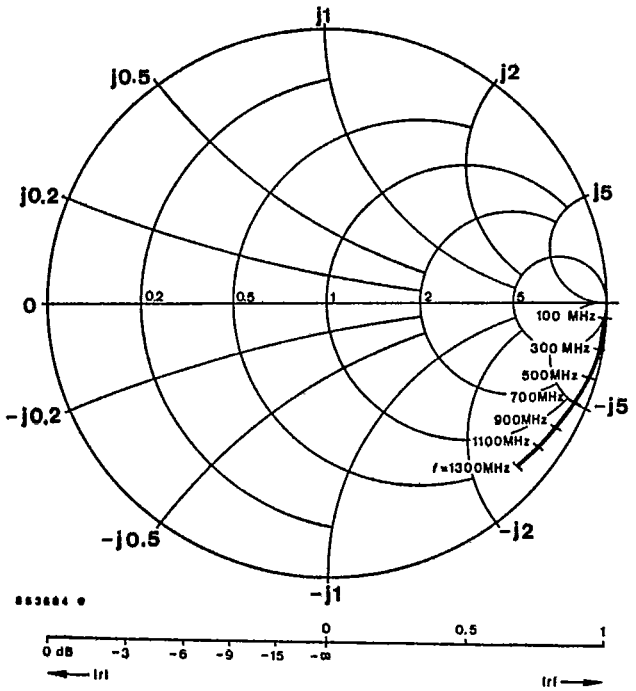

S_{22}

I_D = 3...10mA
V_{DS} = 15V
V_{G2} = 4V
Z_o = 50Ω
f = 100...1300MHz
T_{amb} = 25°C

Fig.14

7. Taping and Reeling

T-91-20

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:

BC 238 C DU 06 Z

- Order-No. of Type
- Code for TO-92 Transistors
- Orientation of transistor on tape [1]
- Additional marking for specials [2]

[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 "0": 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

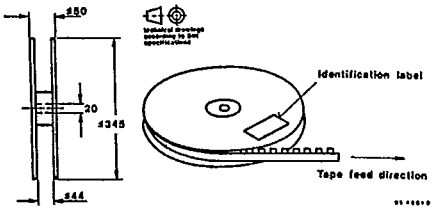

Fig. 7.1. Dimensions of reel in mm

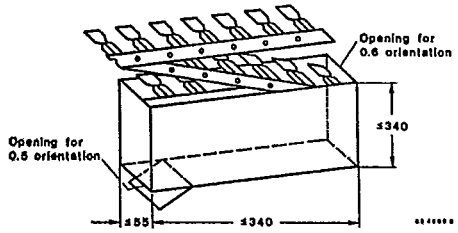

Fig. 7.2. Dimension of box for Zigzag folding in mm

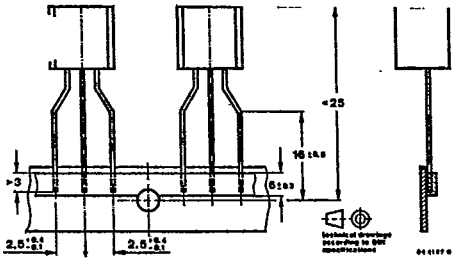

Fig. 7.3 Dimensions of tape in mm

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

7.2.1. Designation

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-GS 08.

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.

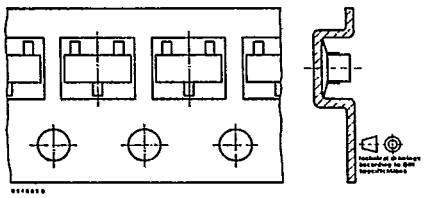

Fig. 7.4 Standard taped SOT 23

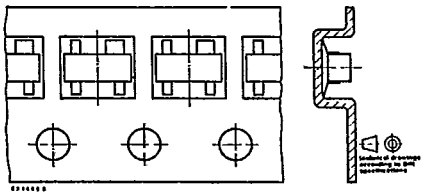

Fig. 7.5. Standard taped SOT 143

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-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. 7.6.

Regarding MOS-FET and MES-FET devices, reverse taping is at present not available.

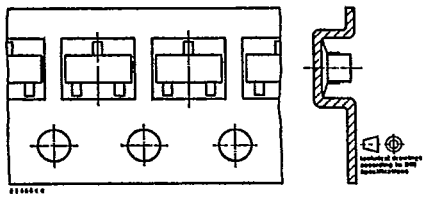

Fig. 7.6 Reverse taped SOT 23

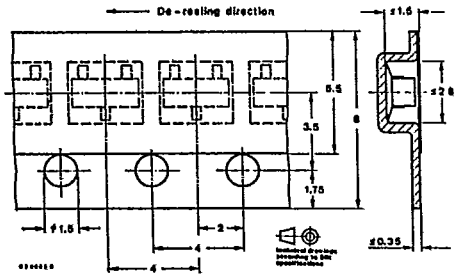

Fig. 7.7 Dimensions of tape in mm

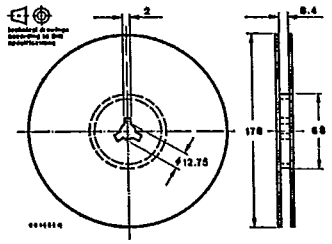

Fig. 7.8 Dimensions of reel in mm

7.2.2 Quantity of devices

3000 devices per reel