UHF power transistor BLU86

FEATURES

- SMD encapsulation
- Emitter-ballasting resistors for optimum temperature profile
- Gold metallization ensures excellent reliability.

DESCRIPTION

NPN silicon planar epitaxial transistor encapsulated in a SOT223 surface mounted envelope and designed primarily for use in mobile radio equipment in the 900 MHz communications band.

PINNING - SOT223

PIN	DESCRIPTION
1	emitter
2	base
3	emitter
4	collector

QUICK REFERENCE DATA

RF performance at $T_S \leq 60$ °C in a common emitter class-B test circuit (see note 1).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)
c.w. narrow band	900	12.5	1	> 7	> 55

Note

1. T_S = temperature at soldering point of collector tab.

PIN CONFIGURATION

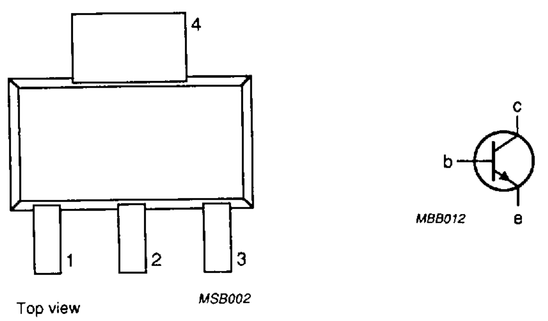


Fig.1 Simplified outline and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	32	V
V_{CEO}	collector-emitter voltage	open base	–	16	V
V_{EBO}	emitter-base voltage	open collector	–	3	V
I_C, $I_{C(AV)}$	collector current	DC or average value	–	200	mA
I_{CM}	collector current	peak value; f > 1 MHz	–	600	mA
P_{tot}	total power dissipation	f > 1 MHz; T_S = 129 °C (note 1)	–	2	W
T_{stg}	storage temperature range		–65	150	°C
T_j	operating junction temperature		–	175	°C

Note

1. T_S = temperature at soldering point of collector tab.

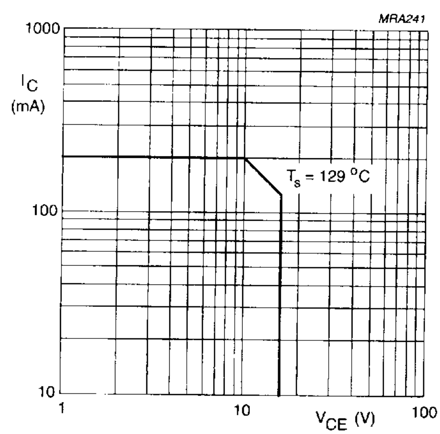


Fig.2 DC SOAR.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$R_{th\ j\text{-}s(DC)}$	from junction to soldering point	P_{tot} = 2 W; T_s = 129 °C	23	K/W

CHARACTERISTICS

$T_j = 25\ °C$.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 2.5$ mA	32	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	open base; $I_C = 10$ mA	16	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	open collector; $I_E = 0.5$ mA	3	–	–	V
I_{CES}	collector-emitter leakage current	$V_{BE} = 0$; $V_{CE} = 16$ V	–	–	1	mA
h_{FE}	DC current gain	$V_{CE} = 10$ V; $I_C = 150$ mA	25	–	–	
E_{SBR}	second breakdown energy	L = 25 mH; $R_{BE} = 10\ \Omega$; f = 50 Hz	0.3	–	–	mJ
C_c	collector capacitance	$V_{CB} = 12.5$ V; $I_E = I_e = 0$; f = 1 MHz	–	2.2	2.6	pF
C_{re}	feedback capacitance	$V_{CE} = 12.5$ V; $I_C = 0$; f = 1 MHz	–	1.2	1.8	pF

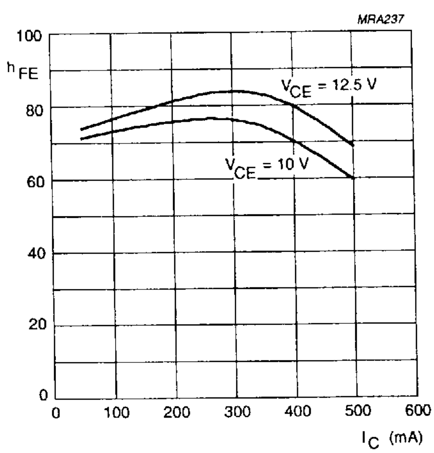


Fig.3 DC current gain as a function of collector current; typical values.

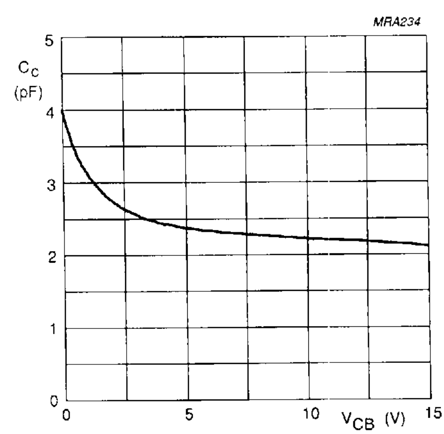


Fig.4 Collector capacitance as a function of collector-base voltage, typical values.

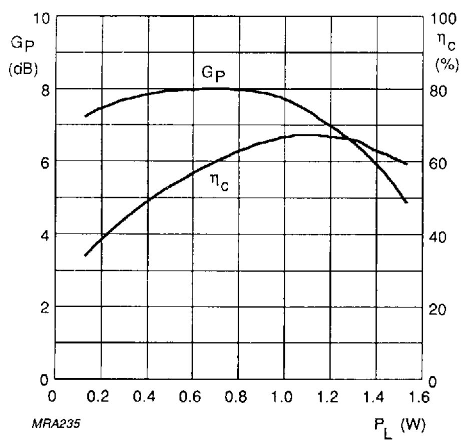
APPLICATION INFORMATION

RF performance at $T_s \leq 60$ °C; in a common emitter class-B test circuit (see note 1).

MODE OF OPERATION	f (MHz)	V_{CE} (V)	P_L (W)	G_p (dB)	η_c (%)
c.w. narrow band	900	12.5	1	> 7 typ. 7.7	> 55 typ. 66

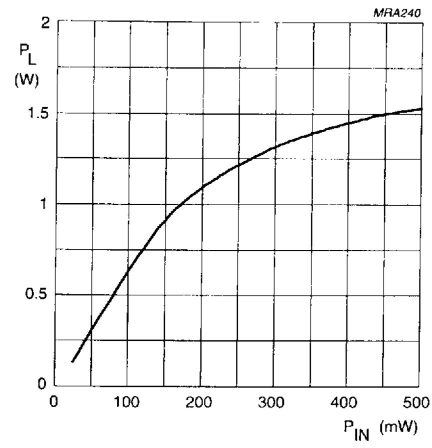
Note

1. T_S = temperature at soldering point of collector tab.



Class-B operation; V_{CE} = 12.5 V; f = 900 MHz.

Fig.5 Gain and efficiency as functions of load power, typical values.



Class-B operation; V_{CE} = 12.5 V; f = 900 MHz.

Fig.6 Load power as a function of drive power, typical values.

Ruggedness in class-B operation

The BLU86 is capable of withstanding a full load mismatch corresponding to VSWR = 50:1 through all phases at rated output power, up to a supply voltage of *15.5 V*, *f = 900 MHz* and $T_S \leq 60$ °C, where T_S is the temperature at the soldering point of the collector tab.

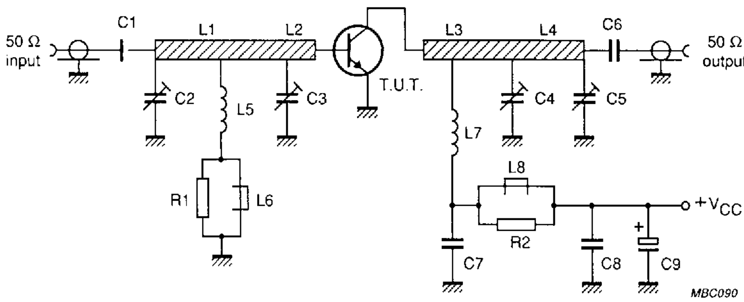


Fig.7 Class-B test circuit at f = 900 MHz.

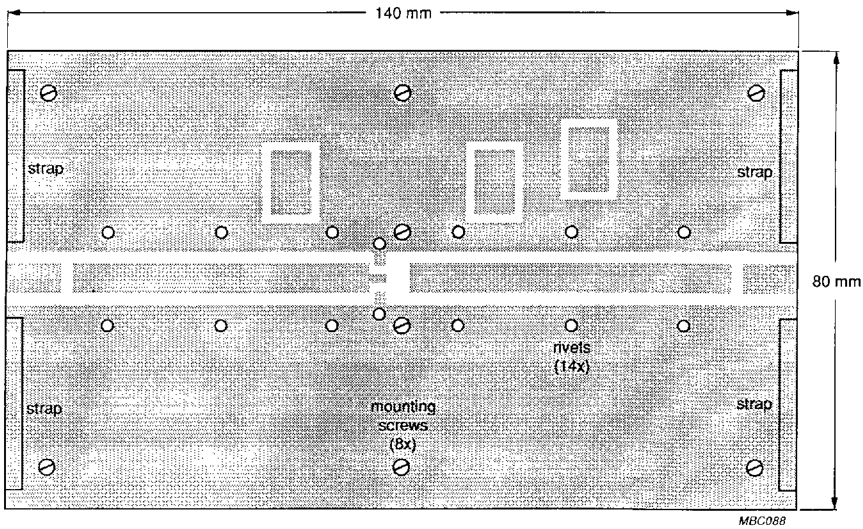
List of components (see test circuit)

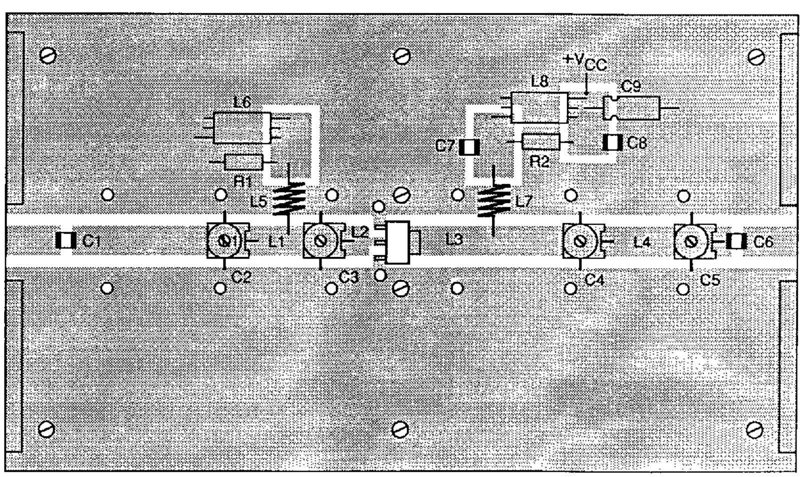
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C6	multilayer ceramic chip capacitor (note 1)	100 pF		
C2, C3, C4, C5	film dielectric trimmer	1.4 to 5.5 pF		2222 809 09001
C7	multilayer ceramic chip capacitor (note 1)	220 pF		
C8	multilayer ceramic chip capacitor (note 1)	1 nF		
C9	63 V electrolytic capacitor	2.2 μF		
L1	stripline (note 2)	50 Ω	17 mm x 4.7 mm	
L2	stripline (note 2)	50 Ω	5 mm x 4.7 mm	
L3	stripline (note 2)	50 Ω	32 mm x 4.7 mm	
L4	stripline (note 2)	50 Ω	20 mm x 4.7 mm	
L5, L7	6 turns enamelled 0.8 mm copper wire		int. dia. 3 mm	
L6, L8	grade 3B1 Ferroxcube wideband HF choke			4312 020 36640
R1, R2	0.25 W metal film resistor	10 Ω, 5%		

Notes

1. American Technical Ceramics (ATC) capacitor, type 100B or other capacitor of the same quality.
2. The striplines are mounted on a double copper-clad printed circuit board, with PTFE fibre-glass dielectric ($\varepsilon_r = 2.2$); thickness 1/16 inch.

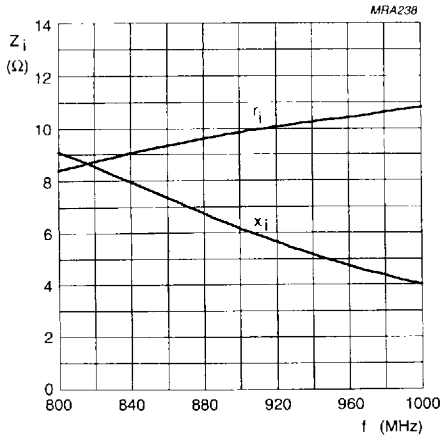
UHF power transistor BLU86





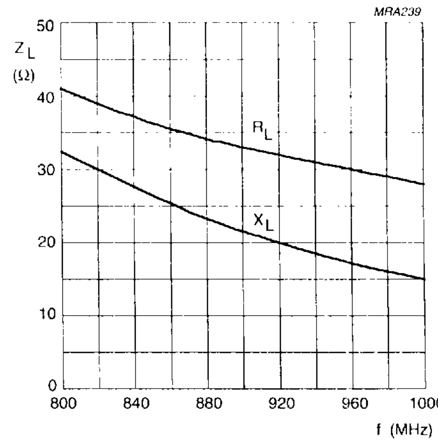
The circuit and components are situated on one side of a copper-clad PTFE fibre-glass board; the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by means of fixing screws, hollow rivets and copper foil straps, as shown.

Fig.8 Component layout for 900 MHz class-B test circuit.



Class-B operation; V_{CE} = 12.5 V; P_L = 1 W.

Fig.9 Input impedance (series components) as a function of frequency, typical values.



Class-B operation; V_{CE} = 12.5 V; P_L = 1 W.

Fig.10 Load impedance (series components) as a function of frequency, typical values.

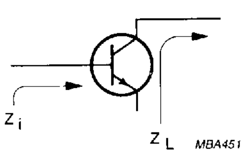
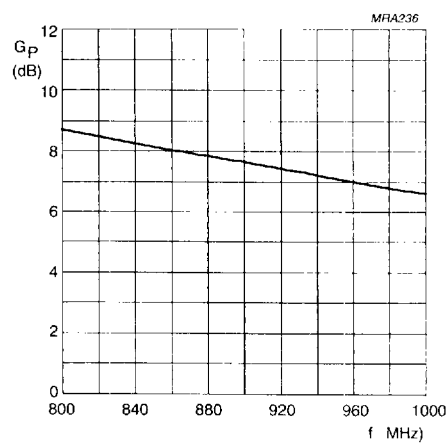


Fig.11 Definition of transistor impedance.



Class-B operation; V_{CE} = 12.5 V; P_L = 1 W.

Fig.12 Power gain as a function of frequency, typical values.

PROGRAMMABLE UNIJUNCTION TRANSISTOR

Planar p-n-p-n trigger device in a microminiature plastic envelope intended for applications in thick and thin-film circuits. It is intended for use in switching applications such as motor control, oscillators, relay replacement, timers, pulse shaper, trigger device etc.

QUICK REFERENCE DATA

Gate-anode voltage	V_{GA}	max.	70 V
Anode current (d.c.) up to T_{amb} = 25 °C	I_A	max.	175 mA
Junction temperature	T_j	max.	150 °C
Peak point current V_S = 10 V; R_G = 10 kΩ	I_P	<	5 μA
Valley point current V_S = 10 V; R_G = 10 kΩ	I_V	>	30 μA

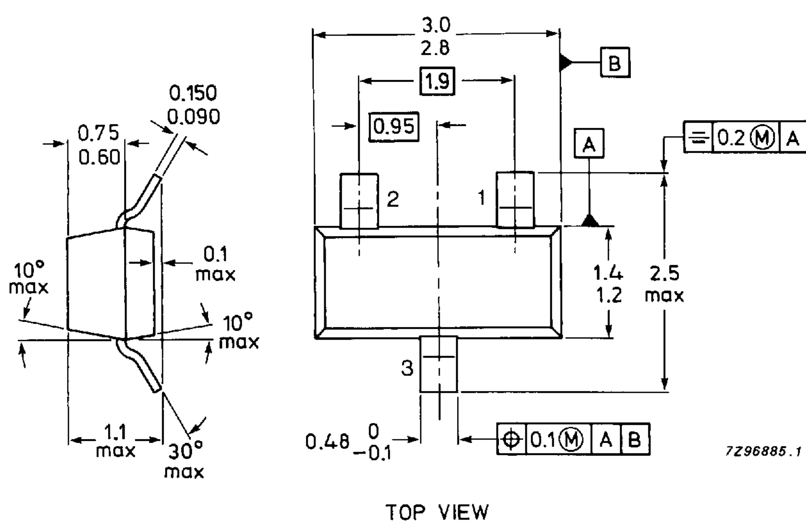
MECHANICAL DATA

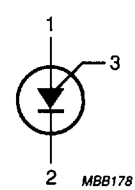
Dimensions in mm

Marking code

BRY61 = A5p

Fig. 1 SOT-23.





See also *Soldering Recommendations*.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Gate-anode voltage	V_{GA}	max.	70	V
Anode current (d.c.) up to T_{amb} = 25 °C	I_A	max.	175	mA
Repetitive peak anode current t = 10 μs; δ = 0,01	I_{ARM}	max.	2,5	A
Non-repetitive peak anode current t = 10 μs; T_j = 150 °C	I_{ASM}	max.	3	A
Rate of rise of anode current up to I_A = 2,5 A	$\frac{dI_A}{dt}$	max.	20	A/μs
Storage temperature	T_{stg}	−65 to + 150		°C
Junction temperature	T_j	max.	150	°C
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	250	mW

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j\text{-}a}$	=	500	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Peak point current (see Figs 2, 3 and 4)				
V_S = 10 V; R_G = 10 kΩ	I_P	<	5	μA
V_S = 10 V; R_G = 1 MΩ	I_P	<	1	μA
Valley point current (see also Figs 2, 3 and 4)				
V_S = 10 V; R_G = 10 kΩ	I_V	>	30	μA
V_S = 10 V; R_G = 1 MΩ	I_V	<	50	μA
Offset voltage (see Fig. 12) I_A = 0 (for V_P see Fig. 2; for V_S see Fig. 4)	V_{offset}	=	$V_P - V_S$	V

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

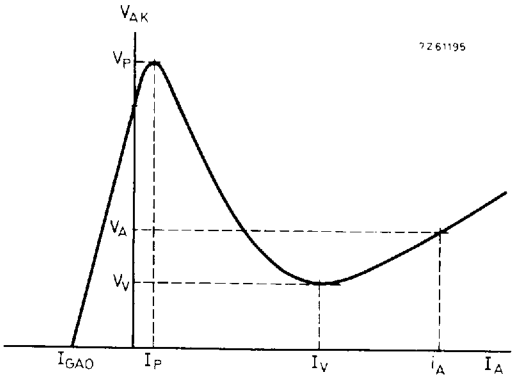


Fig. 2 See also Fig. 11.

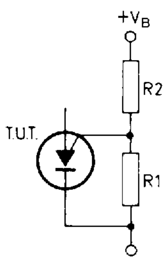


Fig. 3 BRY61 with "program" resistors R1 and R2.

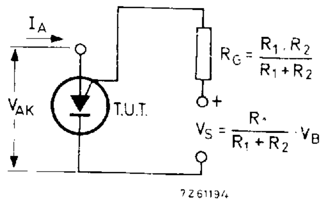


Fig. 4 Equivalent test circuit for characteristics testing.

Gate-anode leakage current (Fig. 5a)
$I_K = 0$; $V_{GA} = 70$ V — I_{GAO} < 10 nA

Gate-cathode leakage current (Fig. 5b)
$V_{AK} = 0$; $V_{GK} = 70$ V — I_{GKS} < 100 nA

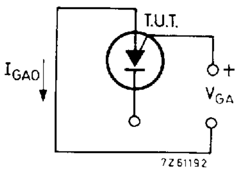


Fig. 5a.

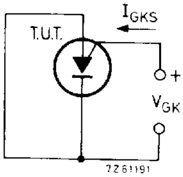


Fig. 5b.

Anode voltage			
I_A = 100 mA	V_A	<	1,4 V
I_A = 180 mA	V_A	<	1,6 V
Peak output voltage			
V_{AA} = 20 V; C = 200 nF (see Fig. 12)	V_{OM}	>	6 V
Rise time			
V_{AA} = 20 V; C = 10 nF (see Fig. 12)	t_r	<	80 ns

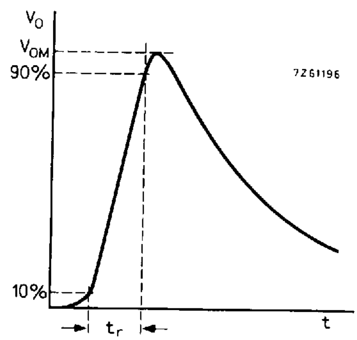


Fig. 6 Output voltage waveform.

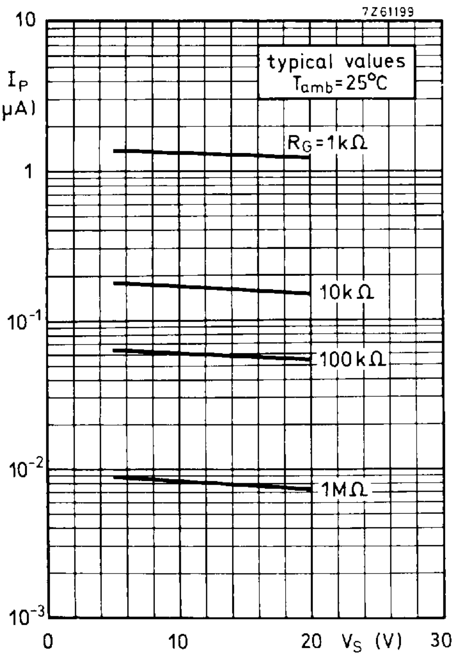


Fig. 7.

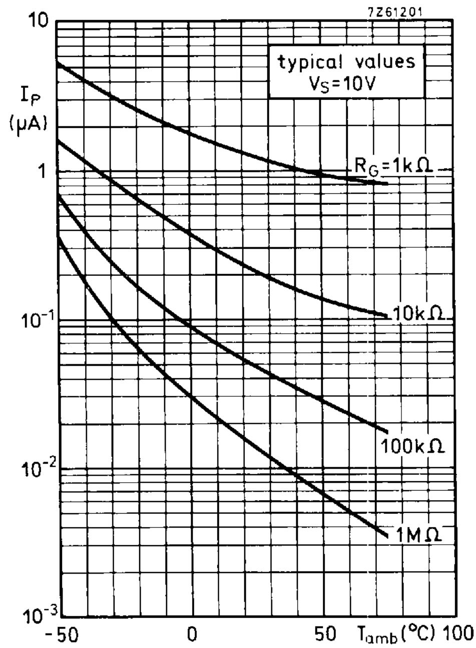


Fig. 8.

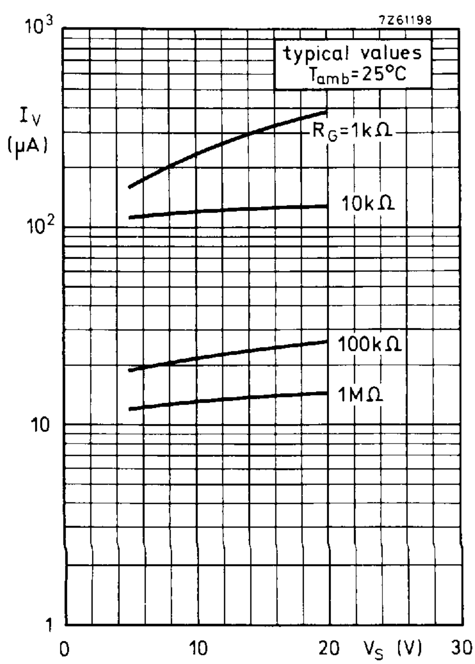


Fig. 9.

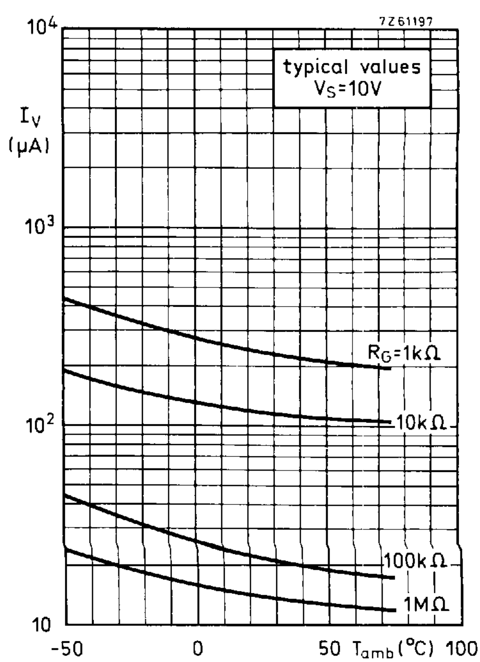


Fig. 10.

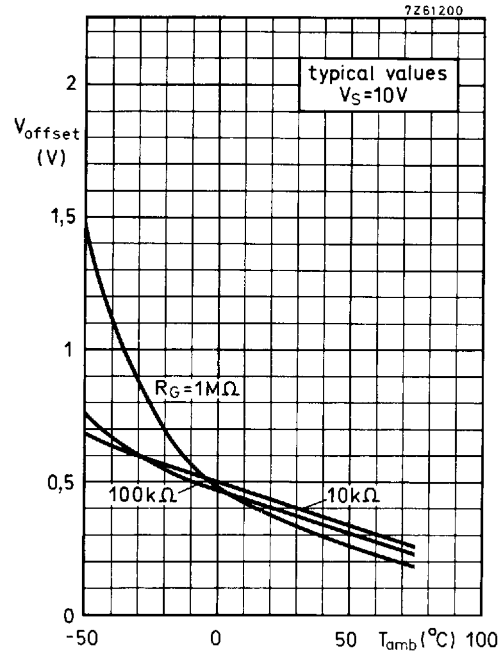
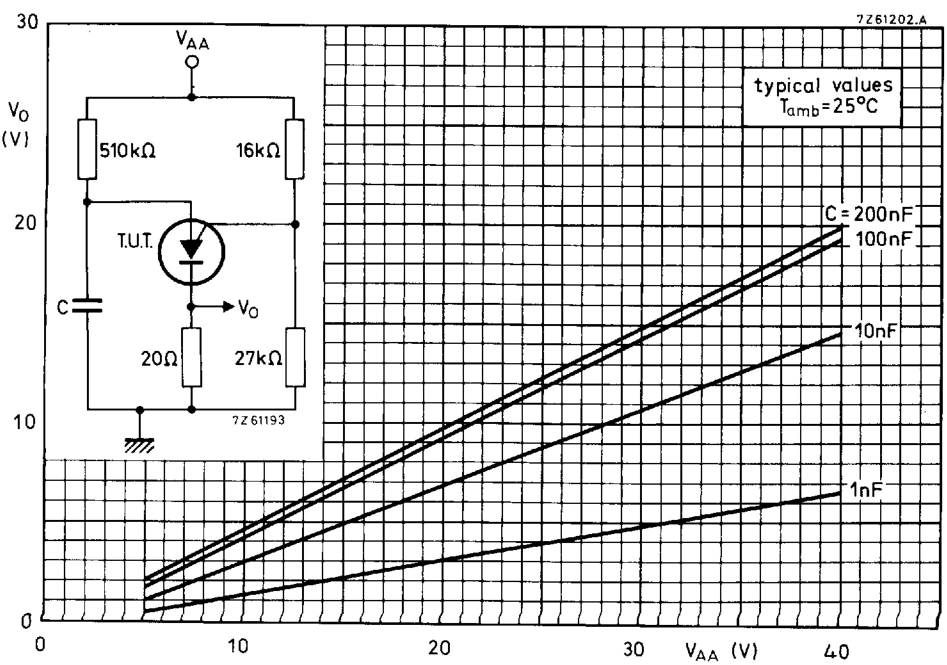

7Z61200
typical values
V_S=10V
V_{offset} (V)
2
1,5
1
0,5
0
R_G=1MΩ
100kΩ
10kΩ
-50
0
50
T_{amb} (°C)
100

Fig. 11.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typical values
T_{amb}=25°C
V_O (V)
30
20
10
0
V_{AA}
510kΩ
16kΩ
T.U.T.
C
V_O
20Ω
27kΩ
7Z61193
C = 200nF
100nF
10nF
1nF
0
10
20
30
V_{AA} (V)
40

Fig. 12.